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BESSON'S NEPHOMETER

A new instrument for measuring the cloudiness of the sky.—[See page 256.]

SCIENTIFIC AMERICAN

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The Editor is always glad to receive for examination illustrated articles on subjects of timely interest. If the photographs are *sharp*, the articles *short*, and the facts *authentic*, the contributions will receive special attention. Accepted articles will be paid for at regular space rates.

The purpose of this journal is to record accurately, simply, and interestingly, the world's progress in scientific knowledge and industrial achievement.

America and the Gordon Bennett Cup

OUR request for correspondence on the question of the causes of our inability to make any defense of the Gordon Bennett Cup has met with a quick response from one who is pre-eminently qualified to speak with authority on this subject. Mr. Charles M. Manley, whose letter appears on another page, was the engineer associated with Langley in the classic experiments in flying made over the Potomac River. His contention that the difference between American and French machines is largely one of the degree of excellence of workmanship, comes with particular force from the man who designed and built the beautiful and extremely light motor for the Langley aerodrome, which is at present in the Smithsonian Institution, Washington. Mr. Manley asks: "Is not the progress which our inventors and builders have made in hydro-aeroplanes fully as important as the more spectacular achievements in speed?" Undoubtedly, next to the work of the Wright brothers in giving birth to the man-carrying motor-driven aeroplane, that of Curtiss, in producing the first practical hydro-aeroplane, is the most important contribution to aviation, certainly in this country and possibly in the whole world. Mr. Manley evidently considers the dearth of capital in the aeroplane industry is not chargeable so much to the capitalist as it is to the United States Government. That is to say, if our Government provided appropriations of a sufficient amount to justify the manufacture of aeroplanes on a liberal scale, just as the French government has been doing, it is probable that capital would regard the aeroplane industry as an attractive field for investment.

Good Rails and the Rail Mills

WE commend for careful reading the letter, which will be found in our correspondence columns, from an authority on the subject of steel manufacture, dealing with the subject of the manufacture of reliable steel rails. By way of comment on Mr. Wellman's letter, we invite attention to the following facts:

As a result of the alarming increase in rail failures which occurred a few years ago, the subject was taken up by the American Railway Engineering Association, who formed a committee composed of eminent railway engineers and representatives of the rail manufacturers, which was instructed to make an exhaustive investigation. The report of this committee was recently made public. A careful reading of this report, and particularly of the papers presented in this city at the recent International Congress for Testing Materials, points to the following conclusions:

The claim of the railmakers that a reasonably high percentage of carbon is responsible for piping and the breakage of steel rails is not established by the latest expert evidence.

R. Trimble, Chief Engineer of Maintenance of Way, N. W. System, Pennsylvania Lines, as a result of an investigation of statistics from eighty-four railroad companies, relating to 12,893,007 tons of rail failures, finds that "difference in carbon does not account for variation in rate of failure." This statement was borne out by a confidential report of one of the largest railroad systems in the country, in which there appears the following conclusion based on a study of failed rails on that system for a period of three years: "Increase of carbon has not caused an increase of rail failure due to brittleness, but the reverse."

Although Mr. Wellman is undoubtedly correct in stating that a liberal discard (cutting off of the inferior top of the ingot) will not entirely remove all piping, it cannot be denied that the chance of having defects in finished rails is much reduced by a liberal discard. This is shown by the paper of J. R. Onderdonk, Engineer of Tests, Baltimore and Ohio Railroad System, in the same report of the Committee on Rails: "Being one of a committee to investigate this subject in 1905," he says, "we visited the different rail mills and were told that this defect—split rails—was due wholly to not having had the proper top discard" and at the conclusion of his paper, he says: "The blooms should be cut back until solid metal is reached; which does not seem to be accomplished with the present method of shearing," in which a uniform percentage of discard is used for all ingots irrespective of their quality.

That alloy steel will solve the question of proper rail manufacture is not only open to doubt, but the tests so far made have proved that any improvement in some directions from the use of alloys may be more than compensated by troubles in other directions. The chief engineer of one of our leading railroads informs us that he found nickel steel, for instance, to be unreliable. On the subject of titanium steel, of which we hear so much to-day, we have, as a guide, the recent investigation made by M. H. Wickhorst, Engineer of Tests, Rail Committee, dealing with the subject of pipeless ingots. In his summing up Mr. Wickhorst says that "while the use of one tenth of one per cent or more of metallic titanium prevents the honeycombed conditions; . . . it is also attended with larger and deeper pipe. . . . Large internal flaws were found in rails considerably lower down from the top of the ingots in steel treated as mentioned, than in rails made from plain steel."

That the use of heavier rails will be a cure for breakages is disproved not only by the wide experience of American engineers, but by the report already mentioned on the investigation of over ten million tons of broken rails, among the findings of which we notice this: "The average performance of the heavier sections is not so good as the average performance of the lighter sections," which to our mind is at least a suggestion that the lighter rails of an earlier date of manufacture were made with less haste and greater care.

That the railroad companies are sincerely desirous of obtaining a higher quality of rail, even at a higher cost, is shown by the widespread advocacy of Open Hearth in preference to Bessemer rails. The superiority of the Open Hearth product is generally acknowledged among railroad engineers. Thus the report of the Committee on Rails says in its conclusion: "The Open Hearth rail as a whole shows a lower rate of failure than the Bessemer."

Summarizing the findings of the Rail Committee's report, and of the excellent articles presented at the recent congress in this city, there seems to be a general consensus of opinion at the present time that the question of such details as chemical composition, section and weight of rail, use of alloys, and the nature of the track maintenance, are subordinate to the greater question of uniformity of product and the general character of manufacture at the rail mills. The SCIENTIFIC AMERICAN is still of the opinion that the question of securing sound rails is a question of greater care and less hurry in the process of manufacture. Improvement should be in the direction of cutting off from the ingot all that part of it which contains segregated material and piping; the casting of smaller ingots; and the more thorough working of the metal during the process of rolling. The Germans have shown us that, at some increase in the cost, piping may be practically eliminated. Why have our rail manufacturers not taken cognizance of their methods?

The whole subject of method of manufacture was excellently summarized in the letter of Mr. Richards, Chief Engineer of Maintenance of Way of the Pennsylvania Railroad, of June 22d, 1911, addressed to the American Railway Engineering Association. He believes that a good rail can be made "if the mill practice is right." This opinion was reiterated at the recent congress by Robert W. Hunt, president of the American Society for Testing Materials, who protests against the present method of using large heats of 100 tons, and expresses his belief that "if a positive necessity for sound ingots be commercially established, a commercial way to produce them will be found."

Gyroscopic Action in Aeroplanes

THE question of the effect of the revolving motor upon the equilibrium of the aeroplane is again brought up by the letter of Mr. Brooke published in our correspondence columns. Although the subject has already received considerable attention, even to the extent of having been made the subject of investigation by the French builders of revolving motors, it has been suggested that the matter should be taken up by a committee of impartial investigators and made the subject of exhaustive tests. Theoretically, gyroscopic effects should exist; indeed, the makers have admitted that there are such effects; though they affirm that they are of so slight a character as not to constitute a source of danger. According to our correspondent, the late Paul Peck admitted that he had been troubled, though not to any serious extent, by this action. Evidently, in common with Earle Ovington and other successful flyers, he did not consider that gyroscopic action was of sufficient violence to endanger the stability of an aeroplane in flight. It is conceivable, however, that although the effect is negligible in calm weather and during normal flying, it might prove to be the last straw in producing an upset, due primarily to other and larger disturbing influences.

The Nature and Origin of Life

THERE are problems in science which are essentially modern, and which could not have been even conceived in the minds of the ancients. There are other fundamental problems, which have exercised the minds of thinkers of all ages, and which still remain to baffle the most advanced workers in the fields of modern science. Of such is the problem of the nature and origin of life, selected by Prof. E. A. Schaefer as the topic for his inaugural address before the British Association at Dundee, which we present in abstract on another page of this issue.

All attempts to "define" life are more or less failures. "The ordinary dictionary definition of life is 'the state of living.' Dastre, following Claude Bernard, defines it as 'the sum total of the phenomena common to all living beings.' Both of these definitions are, however, of the same character as Sydney Smith's definition of an archdeacon as 'a person who performs archidiaconal functions.'"

The fact is that such attempts are based upon a logical blunder: the fact that a certain word has come into general use in popular language, does not in any way guarantee that there exists a corresponding objective counterpart. If an example is necessary to illustrate this, we need only remind the reader of the word "ghost." Some of us may "believe" in ghosts, but at any rate their existence is not proved. Similarly, to argue that because the word *life* exists, therefore it must be possible to precisely define a certain objective and clearly circumscribed set of phenomena corresponding to that term is fallacious. This would imply that those who, ages ago, first framed the word *life*, in some way possessed an intimate knowledge of these phenomena—a knowledge which we in our day are far from being able to claim. Prof. Schaefer is careful to avoid entanglement in hopeless "philosophical" quibble. He attempts no definition of life, but dismisses this point with the words: "I am not myself proposing to take up your time by attempting to grapple with a task which has proved too great for the intellectual giants of philosophy, and I have the less disposition to do so because recent advances in knowledge have suggested the probability that the dividing line between animate and inanimate matter is less sharp than it has been regarded, so that the difficulty of finding an inclusive definition is correspondingly increased."

Dropping Bombs on Balloons and Targets

THE recent events at Gotha showed that bomb dropping from aeroplanes is not an easy matter. Prizes of $2,500, $1,000 and $400 are awarded to pilots who fly at 660 feet height and drop the greatest number of bombs in a square of 330 feet, as we already mentioned. The target represents a military bivouac. Two prizes of $750 and $400 are awarded for dropping bombs upon a captive balloon anchored near the ground, the aeroplanes to fly at 165 feet at least. During the events the first pilot to try his skill was Hanuschke, but he was not able to place any of the bombs upon the captive balloon, which had the form of a Zeppelin. Lindpaintner then made a flight, and when at 800 feet height he dropped bombs upon the 330 feet square target and was able to place seven of these in the mark. After an attempt made by Kaspar, whose aeroplane made a bad landing and was smashed to pieces, Palmerburn flew with his machine and dropped three bombs, but only one of these hit the mark. Beil dropped two projectiles, placing one of them inside. A Jena establishment has designed and built a sighting device which is composed of a telescope, a graduated scale and a watch. After reckoning the approximate speed of the aeroplane or airship, its height, and also the height of the target with reference to the sea level by the use of a map, the pilot, taking the speed of the wind into account, sights the object by the telescope, and lets the bomb drop by means of a lever.

Engineering

The Madeira-Mamore Railway, the construction of which has perhaps attracted more attention from the world at large than any other railway enterprise in South America except the Transandine, was opened at Porto Zelho on September 7th, 1912.

Terminals for the State Canal.—The New York State Canal Terminal Commission has adopted plans for an extensive system of docks, piers and warehouses, along the State Barge Canal, the total cost of which will be about $20,000,000. At New York it is proposed to have terminals connected with the projected elevated freight railroads along the Hudson River, Manhattan Island, which is advocated by the present Dock Commissioner.

Lake Submarines for the Navy.—The Lake submarine, built for the United States Navy, has recently undergone successful trials, in which she exceeded every contract requirement. Her surface speed was 14.7 knots, and submerged, just under 11 knots. She was run over the mile course at a predetermined depth from which she did not vary two feet. This vessel holds the record for deep submergence, having reached a depth of 266 feet with her crew aboard.

The Turbines of the "Neptune."—We are informed that the trouble with the "Neptune," which, by the way, has not been rejected by the Government, is that the turbines were over large for the work they had to do and therefore did not show the economy which had been expected. The "Neptune" is to be taken over by the Government, and orders have been issued to put the vessel into commission and run her until the new, high-speed marine turbines, which are being built by the contractors for the ship, are ready.

Trackless Trolleys on Long Island.—We understand that plans have been consumated for the use of the trackless trolley at Flushing, Long Island. The trackless trolley was first successfully introduced in Germany, at which time it was illustrated and described in our columns. The main advantage of the system is the saving of cost due to the elimination of the tracks, and the great flexibility of operation, the whole width of the highway being available for all vehicular traffic, whether horse-drawn or motor-driven.

Locomotives as Fire Engines.—Ten years ago the Pennsylvania Railroad commenced to use railway locomotives as fire engines. To-day there are 612 engines in yard and switching service equipped with special fire-fighting apparatus. The standard equipment for each locomotive consists of 160 feet of 2½-inch hose and a 15-inch cast iron nozzle with a 5/8-inch discharge opening, kept in a box under the running board of the engine. With this equipment engines can throw a stream of water 70 feet. The water is drawn from the tender and is discharged through an ejector by steam from the locomotive boiler.

A 36-knot Destroyer.—The Russian destroyer "Norik," according to *Engineering*, is stated to have exceeded 36 knots on her official trials last month. The vessel, which is 336 feet long by 31 feet 6 inches beam, is of 1,280 tons displacement, and was built at St. Petersburg, the machinery consisting of A. E. G. turbines and oil-fired boilers, being supplied by the Vulcan Company, of Stettin. The designed speed was 35 knots with 36,000 shaft horse-power, but both have been considerably exceeded. This vessel, should the report be correct, is the swiftest destroyer afloat, exceeding the speed of the British destroyer "Swift."

Our Biggest Battleship.—The one battleship authorized by Congress will be considerably larger even than our latest ships. Her displacement will probably work out at between 30,000 and 31,000 tons. Dispatches from Washington state that the length of the ship over all will be considerably over 600 feet, the beam about 98 feet. She is to carry twelve 14-inch guns or two more than the "Oklahoma" and "Nevada." The armor of the "Pennsylvania," as she will be named, will probably be not less than 16 inches on the belt, turrets and barbettes. Her side armor will be placed in deep, horizontal strips, and the base of her single smokestack will be heavily armored.

Vast Subway Extensions for New York.—The amazing rate at which subway travel is increasing in this city has led to a more generous plan on the part of the Public Service Commission for future extensions of the road. The Commission states that the estimated cost of the new developments will be not under $350,000,000. They estimate that the total length of the single tracks in the whole system including the existing subway and elevated lines in Manhattan and the Bronx and the Rapid Transit lines of the Brooklyn Rapid Transit Company will be six hundred and twenty-nine miles, as against the length of two hundred and ninety-six miles of the existing line. In the year ending June 30th, 1911, about eight hundred million passengers were carried. When the new system has been built, the total capacity will be upward of three billion passengers a year.

Science

A New Comet.—We have received an announcement from Harvard College Observatory to the effect that Gale and Sydney discovered a comet on September 8th, 1912, in right ascension thirteen hours, thirty-seven minutes, one second and declination minus thirty-six degrees, thirty-one minutes and two tenths of a second.

Moving Pictures That Talk.—There was recently exhibited in Philadelphia the invention of Dr. Isadore Kitsee, an invention which is a very creditable attempt to produce talking moving pictures. Dr. Kitsee first attacked the problem in 1905. Just how Dr. Kitsee has succeeded in synchronizing a phonograph with a film we are not as yet able to reveal; but in a future number we hope to publish an article in which the invention will be discussed in more or less detail.

Polishing Metals.—All metals are very effectively cleaned for polishing by using a pasty solution of rottenstone and spirits of turpentine. This removes grease and is very effective against the oxide and sulphides which tarnish the metal and prevents effective polishing. After the application of the paste, it should be cleaned off by a dry cloth and the metal polished by any good means, polishing wheel, or a flannel cloth which is most effectively used.

Reducing the Brittleness of Glass.—The brittleness of glass is due to the quick cooling of the hot substance. It is known that constant motion tends to rearrange the molecule in any substance and a similar effect is observed when glass is boiled in a week solution of salt in water, and allowed to cool gradually. The toughness of the glass is increased very much, and the effect of quick heating is less disastrous to them. This is easily applied to articles used in the laboratory and to glass globes for lighting purposes, and prevents much breakage.

Women in German Universities.—The number of women students in the German universities is on the increase, and during the recent half-year there were 2,958 students on the list. These are distributed as follows: In the Prussian universities, 1,962, in the three Bavarian universities 279, in the two Baden universities, 417, and for the others in the German empire, 300; 2,500 of these students are of German nationality. 1,635 of them are following the courses of literature and history, 539 are engaged in natural sciences and mathematics, 625 in medicine, 74 in political economy or agriculture, 39 in law study, 28 in dentistry, 7 in pharmacy and 11 in theology.

The Influence of the Cinematograph.—A striking illustration of the influence of the ubiquitous cinematograph is reported by the American consulate at Belgrade. American fashions have recently become very popular with the young men of that city; there is an unprecedented demand at the local shops for hats, boots, and other wearing apparel similar to that in vogue in the United States; and the American style of hair cutting has come into favor. These innovations are unmistakably the result of the exhibition of moving pictures of American origin. The obvious moral of all this, as the consul points out, is that the cinematograph might be used to great advantage in advertising all kinds of American products. For instance, pictures of American agricultural machinery in operation would probably create a great demand for the thing itself. This plan offers an economical substitute for the actual exhibition of American products in commercial museums and the like.

Synchronous Weather Maps for Eurasia.—The first step in making a scientific weather forecast is to draw a chart, based on telegraphic reports from meteorological stations, showing the distribution of pressure, temperature, clouds, winds, etc. The observations on which the chart is based should be as nearly simultaneous as possible; and, as forecasters have recently come to realize, it is also desirable that the chart should embrace as large an area as possible of the earth's surface. The director of the meteorological service of Russia, General Rykachev, has just laid before his official colleagues of other countries a plan for the inauguration, beginning with the year 1915, of a system of strictly simultaneous telegraphic weather reports, twice a day, from stations scattered over the whole continent of Eurasia, and also from Iceland and the islands of Japan. At present simultaneous observations are available from all parts of Europe, but the stations of Siberia, India, China and Japan take their observations at different hours, and there is no general exchange of the Asiatic observations by telegraph. The "term-hours" proposed for the new system are 7 A. M. and 7 P. M., Greenwich time. The weather maps based on these observations would extend more than half way round the globe. It is proposed to publish the evening map in the European newspapers of the next morning, and the morning map in the afternoon papers. The great utility of such a plan is attested by the experience of the United States Weather Bureau, which now prepares a daily chart of telegraphic observations from a comparatively small number of stations extending around the world.

Aeronautics

Aeroplanes Cannot Land in Paris.—The French Prefect of Police of the Seine Department has issued an order forbidding aeroplanes to land within the limits of the city of Paris. They are also forbidden to descend to, or ascend from, ground situated nearer than 500 meters (1,640 feet) from any inhabited building, excepting authorized aerodromes within the entire district of the Seine Department.

Aviation School for Australia.—An aviation school will soon be opened in the Australian city of Duntroon under the auspices of the British War Office. The Australian Minister for Defense ordered two biplanes and two monoplanes, and two aviators have already been chosen to pilot them. Further machines are to be added from time to time, the idea being to maintain well-equipped branch stations of the flying corps at the State capitals and other important points.

Paddle Wheel Propeller for Aeroplanes.—Joseph Clarkson, of Manchester, Eng., last month made a series of highly successful experiments with a novel form of propeller. Instead of using a two- or three-bladed "fan" or "screw," he employs what corresponds to a steamer's paddle wheel. His tests were made on a light automobile for the purpose of measuring roughly the driving power, and it was found that an increase of 50 to 70 per cent was obtained over the same engine with "screw" propeller—according to the inventor.

Military Aviation in England.—The question of army aeroplanes is making great progress in England just at present. Owing to the good results in the aeroplane flights made at the recent military competition, a bill is to be presented to Parliament for organizing a veritable aerial army, and in order to encourage officers to take part in this enterprise, special funds for pensions and insurances are to be set apart. It is intended to increase the aeroplane material of the army to a great extent, and this will be seen from the fact that the budget for 1911–12 provided a credit of only $650,000, while the budget of 1912–13 will allot as much as $1,500,000, or more than double. The Royal Aeronautic Corps will be composed of 8 fleets, and 7 of these include 12 aeroplanes each. The remaining fleet consists of aeroplanes and airships. The officers will go through pilot training at the Salisbury Plain or Eastchurch grounds, but the second of these establishments is mainly used for marine aviators.

Howard Gill.—It is with deep regret that we record the death of Howard Gill at Chicago, on September 14th. Gill's machine was run into by that of George Mestach. Both machines were sent crashing to the ground forty feet below. Gill's machine turned over in the fall, burying the aviator beneath it. It caught fire immediately after striking the ground. Mestach was flying a Borel monoplane and Gill a biplane of the Burgess-Wright type. Mestach was a trifle behind Gill and apparently was endeavoring to pass above him, as Gill rounded the fourth pylon. In the fast-gathering dusk it was difficult to see what really happened. It seems to be agreed that Gill's machine was overtaken and struck by Mestach's faster monoplane. For an instant the two aeroplanes were locked together; then both plunged downward. Gill died in a hospital. Mestach was also very badly hurt, so badly in fact that his recovery is despaired of at the time of going to press. Readers of the SCIENTIFIC AMERICAN will recall that Gill was the one man who designed and built a machine to compete for the $15,000 prize offered by Mr. Edwin Gould for a multi-motor flying machine. To his lasting credit be it said that he was one of the few aviators in this country who took an interest in a prize which was offered solely for the purpose of making flying safer.

A New Altitude Record.—On September 17th Georges Legagneux established a new world's record for altitude for monoplanes at the Villacoublay aerodrome. He attained a height of 5,720 meters (18,761.60 feet); in other words, more than three and one half miles above the earth. The best previous record was that of Garros, who on Sept. 6th ascended in a Blériot to a height of 16,240 feet. Legagneux's feat was rendered possible, in a way, by the use of oxygen, which he was obliged to use after reaching an altitude of 15,748 feet. The first one thousand meters were ascended in two and one half minutes; the next two stages of one thousand meters required five minutes each; the four thousand meter mark was reached in seven and one half minutes more; and the five thousand meter mark was attained in the next fifteen minutes. The full height of five thousand seven hundred and twenty meters was attained in forty-five minutes, which is rather quick work as climbing goes. The descent from a height of more than three and one half miles was made in less than ten minutes. Above a height of 10,000 feet motors work with great difficulty and soon stop. In submarine boats, too, the motors stop long before the crew begin to feel any evil effects from the exclusion of oxygen. Naturally the question arises: Why should it not be possible to combine with the internal aeronautic and submarine combustion engine an oxygen generating apparatus and to feed oxygen to the cylinders?

New Methods of Measuring Clouds

The Work of Besson at Montsouris Observatory

At many meteorological observatories the movement of clouds is measured by means of Fineman's nephoscope. This instrument consists of a magnetic compass, the case of which is covered with a black mirror, around which is movable a circular metal frame. A little window in this mirror enables the observer to see the tip of the compass needle underneath. On the surface of the mirror are engraved three concentric circles and four diameters; one of the latter passes through the middle of the little window. The mirror constitutes a compass card, its radii corresponding to the cardinal points. On the movable frame surrounding the mirror is fixed a vertical pointer graduated in millimeters, which can be moved up and down by means of a rack and pinion. The whole apparatus is mounted on a tripod stand provided with leveling-screws. To make an observation, the mirror is adjusted to the horizontal with the leveling-screws, and is oriented to the meridian by moving the whole apparatus until the compass needle is seen, through the window, to lie in the north-south line of the mirror (making, however, allowance for the magnetic declination). The observer stands in such a position as to bring the image of any chosen part of a cloud at the center of the mirror, and the vertical pointer is also adjusted by screwing it up or down and by rotating it around the mirror until its tip is reflected in the center of the mirror. As the image of the cloud moves toward the circumference of the mirror the observer moves his head so as to keep the tip of the pointer and the cloud image in coincidence. The radius along which the image moves gives the direction of the cloud's movement, and the time required to pass from one circle to the next its relative speed, which may be reduced to certain arbitrary units.

This instrument is, however, not very easy to use, and gives only moderately accurate measurements.[1] Accordingly M. Louis Besson, the able director of the Observatory of Montsouris, invented his "comb nephoscope" (Fig. 1) in order to secure more accurate determinations of the direction and velocity of cloud movements. This apparatus consists of a horizontal bar fitted with several equidistant spikes and mounted on the upper end of a vertical pole which can be rotated on its axis. When an observation is to be made the observer places himself in such a position that the central spike is projected on any chosen part of a cloud. Then, without altering his position, he causes the "comb" to turn by means of two cords in such a manner that the cloud is seen to follow along the line of spikes. A graduated circle, turning with the vertical pole, gives the direction of the cloud's motion; it is read with the aid of a fixed pointer. Moreover, when the apparatus is once oriented, the observer can determine the relative speed of the cloud by noting the time the latter requires to pass from one spike to the next. If the instrument stands on level ground, so that the observer's eye is always at the same height, and if the interval between two successive spikes is equal to one tenth of their altitude above the eye-level of the observer, one need only multiply by 10 the time required for the cloud to pass over one interval to determine the time the cloud travels a horizontal distance equal to its altitude.

M. Besson has also revived an old method of Bravais for measuring the actual height of clouds. The apparatus in this case consists of a plate of glass having parallel faces, mounted on a graduated vertical circle which indicates its angle of inclination. A sheet of water (Fig. 3), situated at a lower level, serves as a mirror to reflect the cloud. The water is contained in a reservoir of blackened cement surrounded by shrubbery, and is only a small fraction of an inch in depth, so that the wind may not disturb its level surface.

The observer, having mounted the glass plate on the horizontal axis of a theodolite (Fig. 2) set on a window-sill some 30 or 40 feet above the ground, places his eye close to it and adjusts its inclination so that the images of a cloud reflected in the plate and in the sheet of water coincide. Then from a curve traced once for all on a sheet of plotting paper he reads off the altitude of the cloud corresponding to the observed angle of the glass plate. The curve is plotted from simple trigonometrical calculations.

At the Observatory of Montsouris the degree of cloudiness, i. e., the amount of the whole sky covered with clouds at a given moment, is determined by means of the *nephometer* (front page), also devised by M. Besson. This consists of a convex glass mirror, a segment of a sphere, about twelve inches in diameter, in which

[1] A greatly improved form of reflecting nephoscope, based in part upon Fineman's, was introduced in 1896 by Prof. C. F. Marvin for the use of the U. S. Weather Bureau.

Fig. 1.—Besson's comb nephoscope.

By means of two cords attached to the vertical axis the observer turns the "comb" until the cloud appears to travel along it. A dial at the base of the axis indicates the direction of the cloud's motion.

is seen the reflection of the celestial vault divided into ten sections of equal area by means of lines engraved on the glass. As shown in our front page engraving, the meteorologist observes through an eyepiece fixed in an invariable position with respect to the mirror, which latter turns freely on a vertical axis. The observer, whose own image partly obstructs sections 8, 9, and 10, notes the degree of cloudiness in the sections numbered 1 to 7. The cloudiness of each section is estimated on a scale of 0 to 10; zero meaning cloudless, and 10 entirely overcast. He now rotates the mirror and eyepiece 180 degrees and observes the cloudiness in sections 7, 5, and 2, which represent the regions of the sky that at the first observation corresponded to sections 8, 9, and 10.

Fig. 2.—Glass plate and vertical circle.

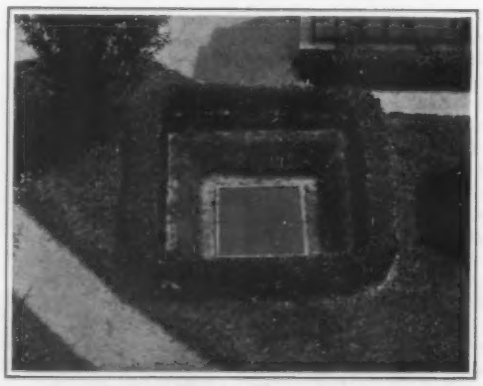


Fig. 3.—Shallow pool of water for reflecting the cloud image.

MEASURING THE HEIGHT OF A CLOUD

Why Not Feet Per Second?

It is a singular testimonial to the persistence of impressions and the natural conservatism of mankind that we continue to use familiar expressions long after they have lost their original correctness of application. Thus we say "miles per hour" in estimating rates of speed, even in cases where only very short distances are covered. This practice has become a habit, and not a very creditable one at that. Much better would be the expression "feet per second," and this phrase would be equally understandable and far more explicit. "Miles per hour" is easily reduced to "feet per second" by a simple formula (the multiplying of the rate of speed in miles per hour by 1.467). Conversely, the rate of speed in feet per second is converted to miles per hour by multiplying the "feet per second" figures by 0.682. Approximately, "feet per second" is one and a half times "miles per hour," and similarly "miles per hour" is about two thirds "feet per second." The following table will be found useful for quick comparisons:

Miles per Hour.	Feet per Second.	Feet per Second.	Miles per Hour.
1	1.47	1	.68
2	2.93	2	1.36
3	4.40	3	2.04
4	5.87	4	2.73
5	7.33	5	3.41
6	8.80	6	4.09
7	10.27	7	4.77
8	11.73	8	5.45
9	13.20	9	6.14
10	14.67	10	6.82
20	29.33	20	13.64
30	44.00	30	20.45
40	58.67	40	27.27
50	73.33	50	34.09
60	88.00	60	40.91
70	102.67	70	47.73
80	117.33	80	54.54
90	132.00	90	61.36
100	146.67	100	68.18

Eskimo Dogs for the Market

At Grove Park, one of the suburbs of London, Mrs. Scott conducts a very interesting dog farm. Her specialty is Eskimo dogs, which she breeds and trains for the market. The market is not very large, but it is sufficient to make it worth her while to raise and train the best possible Eskimo dogs. It is not the food market, nor the ordinary dog market. It is the market for Eskimo dogs which are trained for Arctic exploration. If you decide to make a journey to one of the poles, you know that Eskimo dogs are absolutely essential. You can get good Eskimo dogs in Greenland, or in Alaska. But the good dogs in Greenland may not be exported except by special permission of the Danish government; and the good dogs in Alaska are not so good. One trouble with ordinary Eskimo dogs is that they have no breeding and no discipline. They will obey the master with whom they have been brought up, but when they start after fish or other game, even their master can control them only by the exercise of brute force. For the purposes of your exploration you need dogs that will obey orders given by a white man, dogs that are broken to the harness and are not afraid of work, dogs that have learned team work.

It is this kind of dog that Mrs. Scott raises for the market. Her kennels have only pure blooded animals of carefully selected stock, and from earliest puppyhood she trains them in how to eat and how to work. When she gets through with an Eskimo dog the animal is not nearly so ferocious as one that just "growed up" in the surroundings of an Eskimo village. They adapt themselves quickly to new masters, and they have acquired good eating manners, so that they are not so likely to attack the cupboard or fresh game. Mrs. Scott feeds her animals no meat except pemmican, and dried fish brought from Norway; a large part of the diet is a specially prepared biscuit. She has supplied trained dogs for a number of Arctic and Antarctic expeditions.

How to Make an Ultra-violet Ray Objective

By G. Michaud and J. F. Tristan, Costa Rica College

BECAUSE ultra-violet rays are black light to our eyes we are in ignorance of many of their properties; yet there is an artificial eye, which—as Prof. Wood has shown—can tell us much about their behavior. Amateur photographers with a scientific turn of mind (owners of a camera, who read the SCIENTIFIC AMERICAN belong *de ispe facto* to that class) may contribute to the progress of science, and will find considerable pleasure in the practice of photography with ultra-violet rays. There is no need of expensive apparatus; the only necessary addition to the camera is an objective transparent for ultra-violet rays and only for them; that is, a silvered quartz lens. This is easily made by the amateur himself, with a common spectacle pebble lens. For many reasons it is desirable that this quartz lens be of the same focus as the ordinary objective regularly used on the camera. Moreover, it should be of the periscopic type which, with the diaphragm placed as shown in Fig. 2, will give a satisfactory definition evenly distributed all over the field. All manufacturing opticians sell spectacle pebble periscopic lenses of any desired focus. (Price: $0.50 per lens.) The covering of such a lens with a thin silver film requires the preparation of Liebig's bath: Two grammes of pure fused silver nitrate are dissolved into 40 cubic centimeters of water. Ammonia is added, little by little, until the precipitate formed by the first additions has disappeared. Then 90 cubic centimeters of a 3 per cent solution of caustic soda is slowly poured into the liquid. A black precipitate appears. It is dissolved by means of a few drops of ammonia. Water is then added until the total volume of the solution is 290 cubic centimeters. Last, a weak solution of silver nitrate is added, drop by drop, until one last drop causes a permanent precipitate.

The lens, which has been cleansed, first with soap and water, then with alcohol, is laid horizontally in a glass vessel with its two extreme ends resting on two glass stoppers, the inferior face being about two inches from the bottom of the vessel. Nine volumes of the silver solution are rapidly mixed with one volume of a 10 per cent solution of milk sugar. The mixture is poured into the vessel until it bathes the interior face of the lens. The whole is then left for about four hours in a dark place. Then the lens is immersed ten minutes in rain water and left to dry.

The same operation should be repeated for the other face. The writers found the silvering of the lens on both sides to give more complete and reliable results than a single silver film. It seems difficult to get a film totally free from capillary holes. These do not correspond on two films and the experimenter feels sure that if some visible light has been admitted it had no share in the formation of the image.

With the help of a few strips of black paper the lens is glued, with its convex face upward, over a black pasteboard tube which can be telescoped, at any time, into the objective tube of the camera, behind the shutter, in lieu of the regular objective. Fig. 1 is a section of the ultra-violet ray objective thus made, and Fig. 2 shows it in place, mounted on a Unicum shutter, in lieu of the regular rectilinear combination, the two lenses of which have been unscrewed and put aside.

With a lens made as stated, exposure for a landscape in full sun at noon in June and with an aperture of F/16 should last at least twenty minutes. Photographs of pigments, chemicals, spectra, landscapes, skies, microscopic objects and portraits should always be made twice, once with the ultra-violet rays objective and once with the regular objective. Any peculiarity of the invisible light reflected by the object is thus easily detected. While working on these lines the writers found that while chalk, lime phosphate, arsenious oxide, starch, caffein, and veratrin reflected ultra-violet light about as well as ordinary light, papaverin, quinine sulphate, bismuth subnitrate, practically did not reflect ultra-violet rays. If our retina were sensitive for these rays only, such substances would appear to us as black, in spite of their white color in ordinary light. On the other hand, mercury biiodide, mercuric oxide and orpiment reflected ultra-violet light relatively better than actinic light. Figs. 3 and 4 show a curious result of such differences. Upon a copy of the SCIENTIFIC AMERICAN a layer of mercuric iodide was deposited in the middle of a concentric layer of papaverin. On the photograph made with the ordinary objective the extremely white papaverin looks, of course, whiter than the paper and the red mercuric compound darker than both. The reverse relation can be observed on the photograph made with the silvered quartz lens.

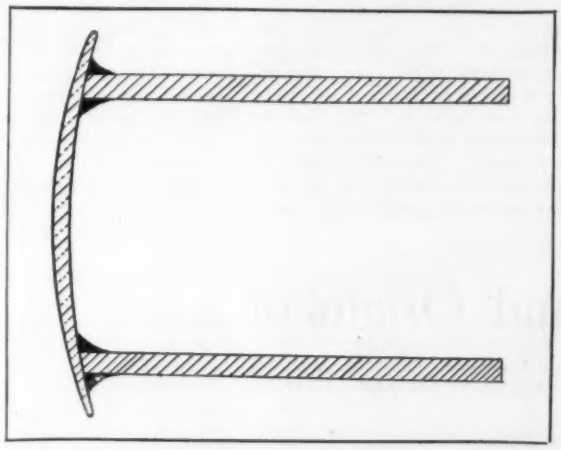


Fig. 1.—Longitudinal section of the ultra-violet ray objective.

Fig. 2.—The ultra-violet ray objective in temporary position.

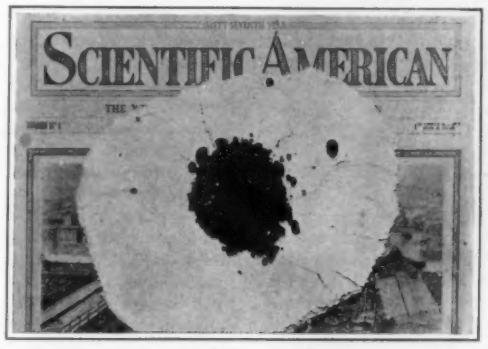


Fig. 3.—Photograph of mercuric iodide, white papaverin and white paper.

Fig. 4.—Ultra-violet ray photograph of materials shown in Fig. 3.

HOW TO MAKE AN ULTRA-VIOLET RAY OBJECTIVE

The World's Production of Gold

By Edward B. Howell

THE accompanying chart shows graphically the world's production of gold from the discovery of America to the close of the year 1911. The horizontal divisions of the chart measure the lapse of time by ten-year periods. The vertical divisions represent the value of the production in American money, each division representing ten million dollars. The production of silver until its demonetization in 1873 is also shown, superimposed on the gold production. Anterior to the discovery of America, the existing stock of gold and silver money in the world is estimated by William Jacob, an English economist who made a very careful investigation of the subject nearly a century ago, to have been from 33,000,000 to 34,000,000 pounds sterling. In round numbers this was $170,000,000 of our money. This amount, relative to the subsequent production, is indicated on the chart by the small square in the circle.

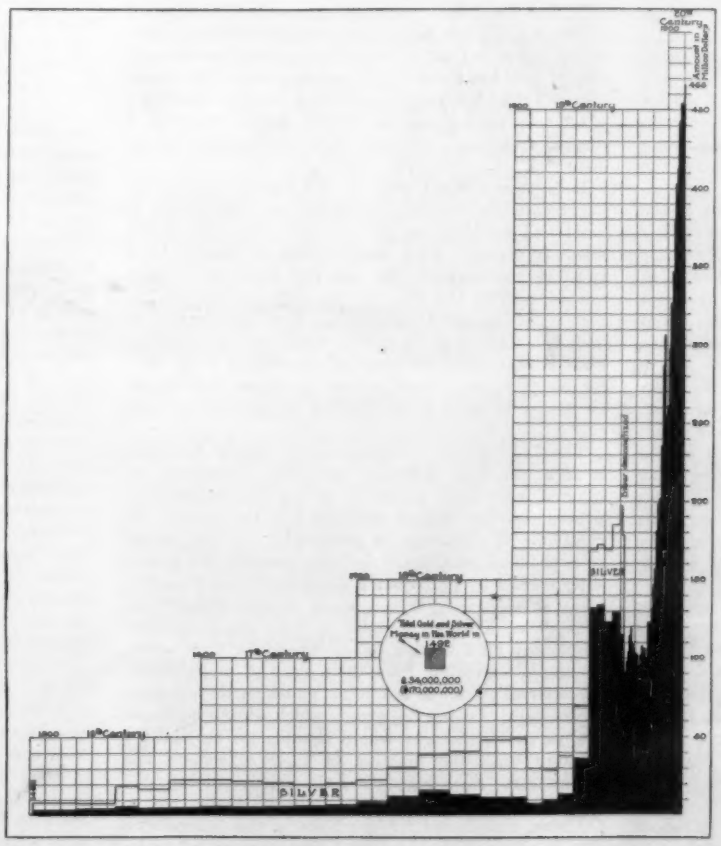


CHART OF THE WORLD'S PRODUCTION OF GOLD AND SILVER

In 1911, the world's production of gold was $466,000,000. Comparing this with the world's stock of money when Columbus discovered America, it may be said that the gold miners of the world last year produced two and three fourths times as much gold as was represented by the world's total accumulations of gold and silver money in 1492. To make the comparison in another way, in 1911 it took the gold miners of the world less than five months to produce an amount of gold equivalent to the world's entire stock of gold and silver money when Columbus discovered America.

It will be seen from this chart that the production of gold in any considerable quantities is a modern function. The sudden increase in gold production began within the memory of many men now living. It began near the middle of the last century when placer gold was discovered in California and Australia.

When the supplies from these newly discovered placer mines began to fail, there followed a period of waning production. During this period silver was demonetized in the leading commercial countries of the world, and this demonetization, coincident with a waning gold supply, and occurring during an era of rapidly expanding trade, occasioned a sharp advance in the purchasing power of gold. In 1873, it required $1.15 per bushel on an average to purchase the wheat crop of that year from the farmers of the United States, but in 1893 the same crop was bought for an average

price of 53 2/5 cents. From the chart it will be seen that about twenty years ago the production of gold ceased to decline and there began a phenomenal increase. It was this enormous increase in the production of gold that effectually settled the so-called "silver question."

During the memorable presidential campaign of 1896, the people of the United States by their votes decided against the remonetization of silver, believing that such a measure would result in a cheapening of our money and a consequent loss in its purchasing power. In 1896 the world's combined production of gold and silver (estimating the silver at its former coining value) was $405,320,800. But in 1911 the world's production of gold alone exceeded this amount by over $60,000,000.

The twentieth century is not very old as yet, but during its eleven years of gold production there has been produced in the world a greater amount of gold by over $1,000,000,000 than was produced during the 356 years from the discovery of America to the discovery of gold in California. During the twentieth century gold is being produced over forty times as fast as it was during the period between 1492 and 1849.

From the discovery of America to the close of the year 1911 the production of gold in the world was something over $14,000,000,000. This was about $10 per capita for all the inhabitants of the globe. But of this vast amount of gold over forty per cent has been produced within the last score of years. This flood of new gold has come principally from its ores as distinguished from placer deposits. Improved modes of concentration and amalgamation, and above all the cyanide process, making profitable the reduction of ores that formerly could not be treated, have brought about the increase. Where this rapidly mounting column of gold production will terminate does not yet appear. If commodity prices continue to advance, it is very certain that some gold mines will be compelled to shut down, for food, clothing and other supplies are necessarily consumed in the process of producing gold, and when gold has so declined in purchasing power that it will no longer buy the things necessary to its production, then at the point or points where this event has occurred, its production will necessarily cease.

Finally, no thinking man can avoid the conclusion that this modern increase in gold production has been a cause, probably the chief cause, of the modern rise of commodity prices. If this is true, then, instead of blaming the trusts for high prices, we should be blaming the too active gold miners of the world.

The Nature and Origin of Life

Prof. Schaefer's Inaugural Address of the British Association

IN opening the discussion of any topic, a natural procedure to follow is to start by defining one's fundamental concepts and terms. Thus the first paragraph of Prof. Schaefer's inaugural address before the British Association at Dundee is devoted to the problem of "defining" life. But the conclusion reached may appear to some unsatisfactory. Prof. Schaefer wisely refrains from giving any definition: "I have the less inclination to do so (i. e., to furnish a definition) because recent advances in knowledge have suggested that the dividing line between animate and inanimate matter is less sharp than it has hitherto been regarded."

In the popular mind there is a tendency to associate together, as if they were inextricably linked together, life and intelligent consciousness. This finds expression in such terms as "animate" and "inanimate," which are commonly used practically as synonyms for "living" and "lifeless," respectively. But there is no scientific warrant for this point of view, and the problems considered by Prof. Schaefer are essentially problems of matter, not problems relating to the "soul" (anima).

Having given up as practically hopeless the attempt to define life, we may next approach the seemingly easier task of describing life in terms of its most characteristic manifestations. But here also we are confronted with difficulties. The man in the street, if he thinks about such things at all, will, in answer to our inquiry after the most characteristic property of living beings, probably mention their power of spontaneous movement. But quite apart from the fact that a large class of living forms—the higher plants—possess this power at most in very rudimentary form, recent developments of science have disclosed purely physical systems—liquid crystals and similar bodies—which manifest seemingly spontaneous motions resembling with astounding closeness those of living forms.

Another property which is commonly cited as specially characteristic of living matter is its power of growth by assimilation from the surrounding medium of matter similar to its own substance. But in this respect also crystals resemble living organism, and the analogy even extends to the formation of new individuals when the "parent" has reached a certain size.

Turning from the physical phenomena of life to the chemical aspect of life processes, a similar observation must be made: the early workers in the field of organic chemistry supposed that the compounds met with in the living organism were peculiar, could be produced only under the influence of a specific "vital force," and were beyond the reach of the creative powers of the chemical laboratory. This illusion was shattered in 1828 by Wöhler's synthesis of urea, followed by innumerable further results all pointing in the same direction, and culminating in the recent work of Fischer and others who are building up polypeptides—substances of the nature of the albuminoids and proteids of the living organisms. There seems to be no vestige of evidence that, in order to explain the chemistry of the living body, we must invoke the aid of a specific "vital force"—we have in fact here, apparently, another case of a mere name without objective counterpart.

Having reached this point of view, the question naturally presents itself to our minds, whether living matter itself may not some day be produced in the chemical laboratory—whether the chemist is destined some day to "create" a living thing. Indications are wholly favorable, in Prof. Schaefer's opinion, to the ultimate realization of this, if only we are reasonable in our expectations. It is not a complicated organism which we must look for (even the lowest forms of life known to us *in nature* are highly complex structures), but something exceedingly elementary, to which indeed we may at first hesitate to attribute "life" as ordinarily understood. It must be remembered that the earliest forms of life on our earth were probably quite incapable of leaving any geological record behind them, as they no doubt consisted entirely of soft parts.

There is much in Prof. Schaefer's address which we would like to dwell on at length, but lack of space forces us to pass over with a mere mention those sections of his paper which deal with the more generally known phases of the theory of evolution. His remarks on the cell-aggregate of the higher organism on cell-life and aggregate life, however, call for more leisurely consideration.

"Our own life, like that of all the higher animals, is an *aggregate life;* the life of the whole is the life of the individual cells. The life of some of these cells can be put an end to, the rest may continue to live.

"On the other hand, if a few cells, such as those nerve-cells under the influence of which respiration is carried on, are destroyed or injured, within a minute or two the whole living machine comes to a standstill, so that to the bystander the patient is dead; even the doctor will pronounce life to be extinct. But this pronouncement is correct only in a special sense. What has happened is that, owing to the cessation of respiration, the supply of oxygen to the tissues is cut off. And since the manifestations of life cease without this supply, the animal or patient appears to be dead. If, however, within a short period we supply the needed oxygen to the tissues requiring it, all the manifestations of life reappear.

"It is only some cells which lose their vitality at the moment of so-called 'general death.' Many cells of the body retain their individual life under suitable circumstances long after the rest of the body is dead. Sherrington observed the white corpuscles of the blood to be active when kept in a suitable nutrient fluid weeks after removal from the blood-vessels. A French histologist, Jolly, has found that the white corpuscles of the frog, if kept in a cool place and under suitable conditions, show at the end of a year all the ordinary manifestations of life. Carrel has succeeded in substituting entire organs obtained after death from one animal for those of another of the same species, and has thereby opened up a field of surgical treatment, the limit of which can not yet be discerned."

It is thus evident that in the higher animals the "aggregate life" is closely dependent on a proper adjustment and coördination between the "cell life" of the separate organs. Such coördination is secured by a two-fold mechanism: On the one hand by nervous control, and on the other by the diffusion through the system of so-called *hormones.* Nervous control of body-functions may be purely reflex and unconscious, or at least, outside the scope of our will, as is the case, for instance, with heart action in normal individuals. Or it may be more or less directly governed by our will and emotions.

The influence of hormones upon bodily functions is of a somewhat different character. Hormones are internal secretions produced in various glands and poured through various channels into the general circulation. Their action is presumably of the nature of a chemical stimulus. Nervous impulses are apparently carried by propagation along nerve strands somewhat as electricity travels along a wire (though the velocity of a nerve impulse is very much smaller). Hormones, on the other hand, depend for their action on actual convection from their place of manufacture, the internal gland, to the points at which they produce their effect. Among the glands which secrete hormones are various structures whose significance remained a mystery until the function of their substances was understood. Such glands are the suprarenal capsules, secreting adrenalin (the only hormone which has so far been reproduced by synthesis in the laboratory), the pituitary body, abnormal development of which is accompanied by abnormal bodily growth (gigantism), and several others which we can not stop to mention.

Allied in character to the action of hormones is that of antitoxines, protective substances produced by the body in reaction to an invasion by disease germs.

At such times the battle for our life is fought with chemical weapons. The bacteria produce toxins, substances which poison us, while our body produces antitoxins, unconsciously putting out poison for this microscopic vermin, much as consciously we put out poison for larger representatives of the parasite tribe.

The discussion of life and disease naturally leads us at last to the consideration of death. This takes place either through accident, disease, or old age. The first two causes are more or less preventable, perhaps, when science has advanced sufficiently far, wholly so. The last is probably a cause inherent in the nature of life, and unavoidable. But, as Prof. Schaefer points out, a natural death by old age, not hastened nor agonized by disease, should be a quiet, painless phenomenon, unattended by violent change. And if we were all certain of a quiet passing; were we sure that there would be "no moaning at the bar when we go out to sea," we could anticipate the coming of death after a ripe old age without apprehension.

A Natural African Silk

IT is proposed to make a commercial use of a native silk coming from the African region which does not appear to have been utilized heretofore. This is a silk found in the Belgian Congo region, and it is furnished by worms of the anaphe, which variety is widespread in the Uganda, the German east Africa, Cameroon and Congo as well as other regions. The African silk corporation has already begun to install plants of the kind in the Uganda and elsewhere, and two other firms are soon to begin work in Belgian Congo. The worms are very voracious and are covered with hairs which have a stinging effect on the skin. They hardly ever change their place except during the night in order to seek food or search for good places for building their nests. They feed on plants such as *Abizza fastigiata,* also *Bridelia micarantha* and others. On the under side of this latter leaf, the anaphe lays 200 or 300 eggs placed in piles and covered with a protecting down. About two months after hatching, the worms proceed to make a combined effort in order to build a kind of nest upon the plants which furnish their food. The nest is of a silky appearance and has a color varying from coffee color to a rusty red. Of an irregular shape, the nests have a size ranging from that of an egg up to a child's head, and they contain from 10 to 100 cocoons tightly pressed together. When the butterfly is hatched, it secretes a liquid which attacks the cocoon and the envelopes of the nest, so that it can find its way to the outside. It appears that this does not injure the silk of the cocoons, so that it is not required to smother the insect within the chrysalis to avoid hatching the butterfly. The nests must be handled under water in order to prevent the nettle-like action of the hairs upon the skin, such hairs and also fragments of skin being scattered through the nest. The silk of the envelopes and that of the cocoons are treated separately, the operation being a washing with carbonate of potash solution until no more color is discharged, then the silk is dried in the air and packages of it are sent to the factories. The yield in the present case is estimated at 1 pound of silk thread coming from 6 pounds of raw silk. It does not seem difficult to carry on silk raising in this case, as the matter of acclimating the silk worm, which is such an important one with the usual kind, does not need to be dealt with here, either for the insect nor for the food plants. No diseases attack the insects, as far as can be noticed.

Correspondence

[The editors are not responsible for statements made in the correspondence column. Anonymous communications cannot be considered, but the names of correspondents will be withheld when so desired.]

The Mississippi River

To the Editor of the SCIENTIFIC AMERICAN:

Noting your editorial of May 25th, page 475, we would like to present the following solution of the Mississippi problem.

Construct a ship canal as follows:

Leave the east bank of the Mississippi River at some point between Memphis and Cairo.

Parallel the river southward until the highlands east of Memphis are passed.

Then follow the general direction of the contour lines toward the southeast.

Continue through the level plains of Mississippi and southern Alabama into Georgia, dropping gradually through the contour lines toward the Gulf of Mexico.

When a point north of the Florida peninsula is reached, turn slightly to the southward and cross all the peninsular contour lines near their centers or highest points.

Dredge the Alabama River and other streams of importance crossed by this proposed route of ship canal.

Place locks and spillways, at the points where important streams cross the ship canal, so as to regulate water levels and facilitate commerce.

ADVANTAGES TO BE GAINED.

1. Relief to the congested lower Mississippi River at flood time.
2. Regulation of the Mississippi River flow at all high-water periods.
3. The creation of an inland system of waterways which will become equal in importance to the Mississippi River.
4. A limited supply of water for irrigation where needed along the upper portion of the canal.
5. An unlimited supply of flood water for irrigation throughout the entire Florida peninsula in the season of greatest need.
6. Silt and clay sediments to balance the sandy soil of Florida in the fields and on the country roads.
7. Fertilizer where it is most needed.

J. L. GOULD.
Fort Myers, Fla. GEORGE M. LUMMIS.

America and the Gordon Bennett Cup

To the Editor of the SCIENTIFIC AMERICAN:

The question asked in your editorial of September 14th, as to the reasons for the exceedingly poor showing made by America in the Gordon Bennett Cup race suggests several collateral questions.

1. Is not the greatest difference between American machines and French ones almost entirely a difference in the degree of perfection of details of the machine?
2. Is not this difference almost entirely due to the characteristic of the French engineers and machinery manufacturers of taking infinite pains, even with the most minute details?
3. Is this due to a difference in temperament, or to the difference in the keenness of competition to which engineers and manufacturers are in general subject in the two countries, or to the difference in thoroughness of the superintendents actually in charge of the workshops, or to the fact that the lower cost of skilled labor in France makes it possible to give to the actual work of construction an amount of time that would be prohibitory in this country?
4. Has not our record in aviation thus far been closely parallel to our record in the development of the automobile, where we did much more notable work in the field of invention than in the workshop? We are distancing the world in the third stage of automobile development—that of supplying the world's demand for efficient low-priced machines, and no doubt we shall repeat this performance when this stage of development is reached in aviation.
5. Is not the progress which our inventors and builders have made in hydro-aeroplanes fully as important as the more spectacular achievement of speed?
6. Is not the great need of aviation in America at this time, if we are to prove worthy competitors of the French in speed events, that we by some means attract to it many more engineers who are also skilled shop men and who have not only a high degree of ability, but also the characteristic of taking infinite pains with even the minutest details?
7. Can the money which this requires be secured in any other way than that through which the French builders secured it; namely, through the awakening of the national government to the importance of aviation in connection with national defense, to the point where the government provided the funds for the purchase at liberal prices of the product of the builders, and the liberal patronage of that part of the public who were both ready and able to co-operate financially?

As the pressure of other matters prevents me from being actively engaged in aviation work at the present time, I have written the above from the point of view of "one on the fence" in the hope that it may, as is sometimes the case, suggest some point of value to the real workers who are usually too busily engaged on problems of immediate importance to make general surveys of the field.

New York city. CHARLES M. MANLEY.

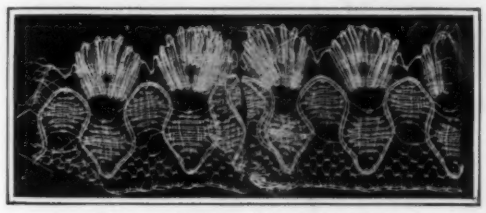
Laces and Flour from Bananas

To the Editor of the SCIENTIFIC AMERICAN:

I am an old subscriber of the SCIENTIFIC AMERICAN, which I consider as the queen of all the reviews of this kind.

In the issue of February 17th, 1912, page 151, under the heading "Banana Cloths," is said: "It has been left to the Chinese to teach us how the tons of banana fiber thrown on the rubbish heap every year can be converted into banana cloth and sold at a most remunerative price." I take the liberty of giving to you the knowledge that long before the Chinese the Brazilians had utilized the fiber of banana trees for cloth and ladies' garments. I inclose a sample of lace that is sold here for one milreis a meter, which corresponds to about 12 cents a foot in American gold.

Also in your issue of July 13th, 1912, page 23, banana flour is advertised as a novelty in the French industry. I send to you one small can of this product, made here by us, which like the banana cloth, has been on our markets in Brazil over twenty years.



Lace made from fibers of banana.

Though you will not be responsible for statements made in the correspondence columns of your journal, I think I must call your attention to the facts above mentioned in favor of our national industry here.

Para, Brazil. FRANCISCO BOLONHA, C.E.

The Steel Rail Problem

To the Editor of the SCIENTIFIC AMERICAN:

I have read your editorial in the issue of August 24th with a great deal of interest, and some surprise. I have been a reader of the SCIENTIFIC AMERICAN for a great many years, and have always found its editorials fair in every way, but in this case I think you are not treating the steel makers fairly when you place all the blame for defective and unsafe rails upon them, when the fact is that the railroads themselves are the ones to blame because they insist in their specifications upon such hard steel, steel which will pipe, and which the most careful examination will not detect. A discard or cutting off of 50 per cent of the ingot or bloom would not be sure to discover all of the piping. It is impossible to detect the last tracing of piping by cutting the bloom when it is hot. It could only be done by nicking and breaking cold. This, of course, is impossible in the regular manufacture of rails.

I am not a rail maker or connected with any works making rails, but for over forty years I have been connected in different capacities with the manufacture of open hearth and Bessemer steel in this country, and, therefore, feel that I ought to know something about it.

Ever since the manufacture of melted steel was begun by Huntsman in Sheffield, more than one hundred years ago, one of the greatest expenses of the process of making high carbon steel has been caused by the piping and the waste occasioned by the steel makers being obliged to top the ingots, that is break them cold until every trace of the pipe is removed. In many cases over one half of the ingot is removed before this has all disappeared. This seems to be as much of a problem with the tool steel maker to-day as it was forty years ago, and this trouble is had with ingots of very small section; most of them 4 to 6 inches square. The piping increases with the size of the ingot, which in most rail mills to-day are from 18 inches to 22 inches square.

You say the steel makers are to manufacture the kind of steel that suits their particular whim. It is many years since they have been allowed to do this. Detailed specifications as to every detail of the manufacture are made, and the inspectors watch day and night to see that the specifications are carried out to the letter, in many cases almost taking the manufacture out of the steel makers' hands.

You say in your article that it is well understood by engineers that it is possible to produce a rail that will stand up under very high speed traffic, and that the failure to produce them is entirely due to the rail makers themselves.

I would like to see proof that this is well understood by engineers. You will, I think, find that the general opinion of engineers is that the rails are made strictly to the railroad's own specifications, and that, therefore, the fault lies with them.

Now the question is, what is the remedy for all this trouble? The answer is very simple; make steel that is low in carbon and phosphorus that will pipe very little if at all. This can be done, but if this is proposed the railroad men immediately say that they will have a rail that will not wear well; they will wear out in a very short time, so they insist on having a hard and consequently brittle rail, and take the risk of broken rails, costly wrecks and the killing of passengers.

Much is being learned lately about alloyed steels, and we now know that there are other hardeners that can be used besides carbon that do not cause piping, but these will increase the cost of the steel somewhat, which the railroad companies would probably object to. First cost seems to be all that the average purchasing agent thinks of.

So it boils down to this—the railroad company in order to save money in renewals insist that the steel maker give them rails that they (the steel makers) know are brittle and unsafe to use, saying in effect "That's none of your business; we will take the risk," and they do, and they and the traveling public pay the bills.

You do not seem to think that the present schedules of the fastest railroad trains are too fast for safety. In this you do not agree with many of the best railroad men in this country. I feel sure they have more than reached the safe limit, and many a railroad man will breathe easier and thank God when such trains as the 18-hour fliers between New York and Chicago are cut down in speed, as they ought to be at once. I speak with a great deal of feeling on this subject because the craze for high speed in railroading has cost me the lives of a dearly beloved brother and two others of the leading men of a large manufacturing concern with which I am connected.

Cleveland, O. S. T. WELLMAN.

Gyroscopic Action of Revolving Aeroplane Motors

To the Editor of the SCIENTIFIC AMERICAN:

Less than two hours before the accident that killed Paul Peck I had a talk with him on the subject of the danger in gyroscopic force. He admitted that at times this force had caused him considerable trouble, but said that he did not believe it to be particularly dangerous. I explained to him several conditions that would excite gyroscopic force in his motor to a point where it would become highly dangerous, and told him that should he ever meet one of these conditions he would be at once convinced that I had not over-estimated the peril, but that he would then be in the same fix as the other fellows that have gone before—*not able to tell about it!* The newspaper accounts of the accident say "No one but Paul Peck could tell exactly what caused the accident."

I had just examined Peck's new machine and told him that he would have to be extremely cautious in the use of his controls as it, in my opinion, would be highly susceptible to the elevator and would rock lightly about its lateral axis. You will notice by the newspaper accounts that after his first flight he spoke particularly about this very feature, and it was no doubt one of these sudden dips that excited gyroscopic force and caused the spiral movement in his machine. I found three eye witnesses, not one of whom was an aviator, who distinctly saw Peck turn his controls contrary to his path of flight, but in all the accounts of the accident, given out by the aviators, not one of them mentioned the fact that the machine spiraled with its *rudder turned to the outside of the circle* and *pitched downward with its elevator raised to the limit!* Nor did any one think it worth while to mention that during all this time the motor was spinning at top speed; yet these three features of the accident, completely ignored in all published accounts, show the real cause and prove the brutal strength of this force when once it is set in motion.

Peck said that while he did not believe there could be any great danger from gyroscopic force, he was open to conviction and asked me to bring out to him on the following afternoon a copy of my new article on the subject. I was there with the copy at the appointed hour, but too late to save the poor fellow.

How much longer are they going to fight against the truth? How many more lives must be sacrificed before they will understand?

Chicago, Ill. THOMAS PRESTON BROOKE.

Professor Dr. Paul Walden

By Dr. George F. Kunz

LE ROI est mort, vive le Roi! Now that the Eighth International Congress of Applied Chemistry has come to a close our thoughts naturally turn in anticipation to the next, the Ninth Congress and its recently appointed president; for, upon the retiring of Dr. Nichols from this office, it became incumbent upon the Congress to elect a new president in his place.

The man upon whom this choice has fallen is Prof. Dr. Paul Walden, a Russian by birth, and director of Polytechnicum at Riga. The present seems a fit occasion briefly to review the life of the chemist who will preside over the Ninth International Congress which is to assemble in 1915 at St. Petersburg, Russia.

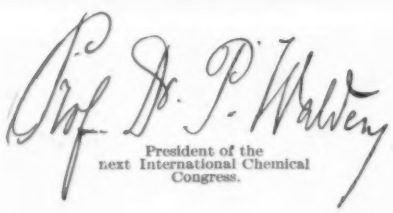
Paul Walden was born near Riga on July 27th, 1863. He received his early schooling at the Realschule in Riga and thereupon entered the Polytechnicum, where he studied among others under Ostwald, who numbers him among his most brilliant pupils. In 1885 he was appointed assistant in the Department of Physics and was transferred in 1888 to the Department of Chemistry. He received his appointment as Professor of Analytical and Physical Chemistry in 1894 and was raised to a full professorship in 1896, being at the same time appointed director of the Polytechnicum. This is the office which he holds at the present time.

Prof. Walden has been a most prolific worker in the field of chemistry and physical chemistry. A list of his publications would fill several columns of these pages. Among the subjects to which he has given his very special attention may be mentioned particularly stereochemistry and the closely allied subject of optical activity. Those of our readers who perused the biography of the great van 't Hoff in our pages some months ago, will remember that stereochemistry, which may be said to owe its birth to van 't Hoff, is that department of the science which deals with the representation of chemical substances by means of three-dimensional formula or, to use the words of the title of one of van 't Hoff's own publications, with the arrangement of the atoms in space. Van 't Hoff, too, it was who pointed out that optical activity is closely related to the stereochemical properties of the compounds which display this property of turning the plane of polarization of light traversing them. A great mass of experimental data on this subject has since been collected by many workers in the field, among which must be mentioned such men as Walden, Landoldt, Frankland, and others.

Apart from his more strictly scientific research work, Walden has also contributed a number of very excellent biographical sketches of great chemists. Of these perhaps the most valuable of all is his life of Ostwald, of which Ostwald himself is reported to have said that he owed fifty per cent of his reputation to this biography.

The high attainments of Prof. Walden and the remarkable work performed by him have been officially recognized by the bestowal upon him of many orders and other honors. Prof. Walden speaks fluently the Russian, Livonian, French and German languages and has considerable familiarity with English and Italian also. He is a fluent and ready speaker and his delivery is dignified and impressive. He speaks directly to the point, with carefully chosen words by which he knows to attract and maintain the close attention of his audience. His expression is invariably clear and leaves no doubt as to his meaning. As is commonly the case, clear thinking in him finds corresponding expression in his words, which accordingly carry conviction to the minds of his hearers.

Prof. Walden is in many respects peculiarly adapted to function as presiding officer for the Ninth Congress of Applied Chemistry. When we consider the complex composition of the body which will assemble, made up as it is of as many, or perhaps more, countries than there are chemical elements, well may we say that no one is better qualified than Prof. Walden, with his intimate knowledge of the art of combining and arranging the various chemical elements, to blend into one homogeneous whole the many heterogeneous components which will be united at the next Congress. Many important subjects will have to be considered, among them whether the annual reports of the International Commission of atomic weights shall be used solely for scientific purposes, or shall be made the basis of technical determinations. The Congress is to determine on some general rule which shall be followed universally, thus doing away with a great deal of unnecessary confusion. The Eighth Congress recommended the adoption of standard methods of examination of ores, metals and fuels; the Ninth will have to decide on the acceptance of the project for an International Center of Congresses with permanent headquarters at the Hague, the proper selection of International delegates, the best arrangement of the papers to be read, and many other points.



President of the next International Chemical Congress.

It is due in no small measure to the splendid leadership of the retired president, Dr. William H. Nichols, that the recent Congress proved such a complete success and closedwith absolute harmony; and we have every cause to be optimistic in our expectations with regard to the equally successful course of the impending Ninth Congress.

The honorary president of the Ninth Congress will be Prof. Dr. Demetri Kamovaloff, the nestor of Russian chemists and Professor Emeritus of the University of St. Petersburg, Russia.

A 10,000-ton Motor-driven Ship

THE arrival of the "Christian X," the first large ocean-going, motor-driven ship, at New York marks another important step in the development of transatlantic travel, an advancement of greater significance than any that has been made since a steamship first crossed the Western Ocean. Had the "Christian X" been a smaller ship of slower speed, and driven by motors of moderate power, the successful passage just accomplished would not be so full of meaning. As matters stand, no one can deny that the era of the motor-driven ocean liner has now been fairly well launched, and the question of applying the oil engine to the propulsion of the fastest and largest of transatlantic liners is henceforth merely one of mechanical development; the 25-knot, 50,000-ton ship is clearly within sight.

The "Christian X," which was built by Burmeister & Wain, Ltd., of Copenhagen, and is owned by the Hamburg-American Company, is a freight and passenger vessel, whose length is 370 feet, beam 53 feet, and maximum draft 24 feet, at which her displacement is 10,200 tons, and her dead weight carrying capacity 5,500 tons. She is driven by twin Diesel engines of a combined maximum indicated horse-power of 2,500.

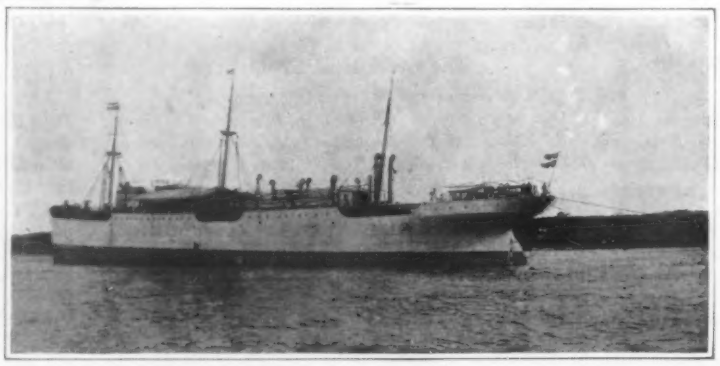
Each engine contains eight cylinders, 20⅞ inches in diameter, and 28¾ inches stroke. In each cylinder head are four valves, respectively for the air admission, fuel admission, the exhaust, and for starting by compressed air. The charge is ignited, on the well-known Diesel system, by the heat of compression, the air being compressed to 475 pounds and corresponding temperature of 650 deg. Cent. In starting the engines, compressed air is drawn for the purpose from two reservoirs at a pressure of 300 pounds to the square inch. The compressed air is utilized for the first three or four strokes, when the air supply is cut out and the oil supply cut in.

There are two auxiliary engines, one on the outboard side of each main engine. Each is a four-cylinder, Diesel motor of 250 horse-power and each is connected to a dynamo for furnishing electric light and power, and to a four-stage air compressor, which is used for supplying air at 300 pounds to the two reservoirs used in starting the main engines. The air for atomizing the oil is further compressed to 900 pounds to the square inch.

The main engines are controlled from the starting platform by means of a lever and a wheel, the first regulating the oil supply, the second the reversing. The reversing gear and the general mechanism for operation of the valves are among the most successful features of the design. We are informed by the chief engineer that, during the tests, with the engines running full speed ahead, the port engine was changed to full speed astern in 10 seconds' time, a remarkable result in an engine of 1,260 horse-power.

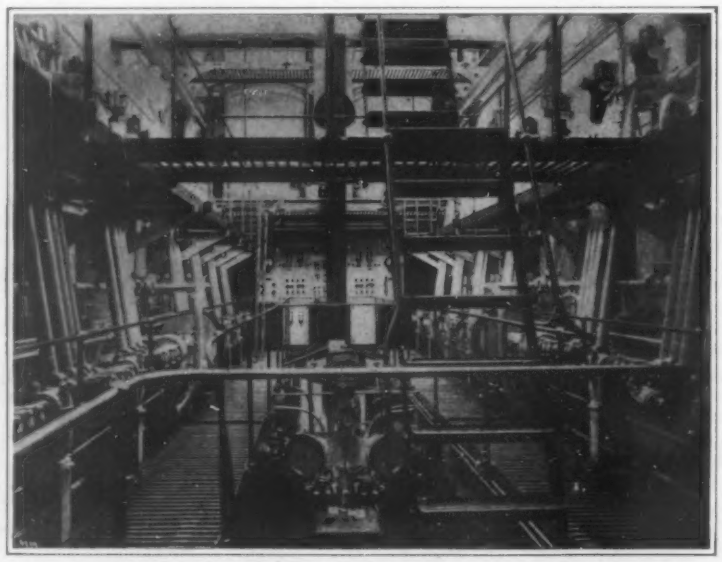
That the first Atlantic crossing by a motor-driven ship of large size has been achieved with perfect success is shown by the following facts: The "Christian X," with a full load aboard, left Hamburg July 23rd, and reached Havana August 9th, having covered 4,627 miles, without a stop, at an average speed of 11.1 knots. The chief engineer informs us that the weather was decidedly bad from the 28th of July to the 5th of August, with winds of from 7 to 8 strength, and a sea which caused the ship to pitch and roll heavily and take much water on deck. The propellers were frequently out of the water: but the Aspinall regulator, which acts directly on the oil feed, gave excellent results, as may be judged from the fact

(Concluded on page 266.)



The first motor-driven freight and passenger ship to arrive at New York.

Twin motors of 2,500 combined horse-power drove this ship from Hamburg to Havana, 4,627 miles, at a speed of 11.1 knots and with a consumption of 0.34 pound of oil per horse-power per hour. Note the absence of smokestacks.



The twin motors of the "Christian X," each of 1,250 horse-power.

A steam plant would reduce the cargo capacity of this ship by 20 per cent. The saving due to the oil motors is $13,000 every 100 days.

The Discovery of a New People

Stefansson's Blond Eskimo of Victoria Land

As late as 1906 Victoria Land, a large island that juts out into the Arctic Ocean, north of Canada, was supposed to be uninhabited. Of the mainland to the south nothing more was known. The coast between Victoria Land and the mainland had been skirted by water no less than four times—in the twenties of the last century by Dr. Richardson; in the forties; in the fifties by Capt. Collinson, and by Amundsen in 1905 during his Northwest Passage expedition. Because the members of these four exploration trips saw little of the land, and because they met no Eskimo on the ice, geographers and ethnologists had all but accepted the belief that the entire country east of Cape Parry to Coronation Gulf was uninhabited. The western or Baillie Island Eskimo had never penetrated farther east than Cape Lyon, and knew nothing definite about any tribes beyond Cape Lyon. Indeed, they regarded the entire country to the east as uninhabitable for lack of food.

Stefansson Seizes a Brilliant Opportunity.

Here was a *terra incognita* that seemed worth a careful scientific survey. Even though it were uninhabited, its geology, its fauna and flora were well worth study. Mr. V. Stefansson of the American Museum of Natural History decided to explore the country. With the financial aid of the Museum and of the Geological Survey of the Canadian government, he organized an expedition. Associated with him was Dr. R. M. Anderson, a biologist of note. In 1908 the Stefansson-Anderson expedition left New York. Proceeding first to Winnipeg, and thence to Edmonton, the explorers went down the Mackenzie, and eventually reached Herschel Island at its mouth. There they expected to pick up supplies. For the first time in twenty years ships found it impossible to penetrate the summer ice to the east of Point Barrow. It was impossible to proceed at once to Victoria Land. Stefansson had to journey to Point Barrow, in order to obtain matches, tobacco, tea, and other necessities for a protracted stay in an unknown country. Although a whole year was thus lost (the distance between Herschel Island and Point Barrow is hundreds of miles) the diversion was not unprofitable. The region about the mouth of the Colville River is scientifically almost virgin field for the geologist and biologist. Accordingly, Dr. Anderson and Mr. Stefansson improved the opportunity to make a study of the country.

The expedition began the work that it set out to accomplish in 1910. On April 27th of that year, Mr. Stefansson with three Eskimo companions started east from Cape Lyon—the most easterly point at which Eskimo houses were seen by Dr. Richardson on his Franklin search expedition, and the most easterly point known to have been visited by Alaskan Eskimo. That the region into which the explorers went was not always uninhabited was proved by the ruins of villages, abandoned by Eskimo not more than half a century ago; and that the tribes who had once lived in the villages engaged in whaling was in turn proved by the bleached vertebræ of whales strewn about.

The Discovery of a New People.

As Stefansson and his companions journeyed farther east the evidences of more recent occupation of the territory became stronger. At Point Wise freshly cut wood was found; at

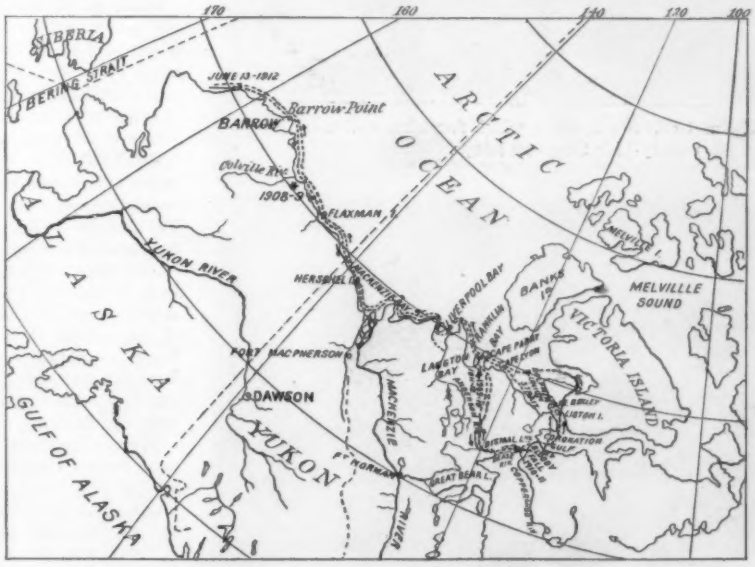
(*Concluded on page 269.*)

A red-bearded blue-eyed Eskimo.

Mr. Stefansson discovered a tribe of forty European-like Eskimo north of Cape Bexley.

Eskimo helping Mr. Stefansson break camp and pack the sleds for the journey.

Among the one thousand Eskimo of Victoria Land are some who have blue eyes and blond hair. The type is so markedly European that it will be a matter of considerable interest and importance to determine whether or not it is the result of an admixture of Scandinavian blood.



Itinerary of the Stefansson-Anderson Arctic expedition.

In late April, 1910, Mr. Stefansson and Dr. Anderson left Cape Lyon, the most easterly point visited by the Mackenzie River Eskimo. The region to the east of Cape Lyon has long been supposed to be uninhabited; for the coast had been skirted by water no less than four times in less than a century and no inhabitants reported. On Dolphin and Union Strait Mr. Stefansson discovered a tribe of Eskimo unknown to anthropologists. In May Mr. Stefansson crossed over to Victoria Land, where he discovered Eskimo with European-like characteristics.

V. Stefansson.

The results of his expedition were extraordinary. "We have covered the last mile geographically that we set out to cover," says Mr. Stefansson, "and have found what we set out to find—a 'new people,' less contaminated, more numerous than any one thought possible."

Eskimo snow house with a tent-like roof of furs.

All the coast of Dolphin and Union Strait was inhabited by Eskimo in former times, but now the most westerly group is the Akuliakatagmiut, near Cape Bexley, discovered by Mr. Stefansson. The camp sites of this tribe are found on every hilltop east of the Coppermine. Until they were visited by Mr. Stefansson these Eskimo had never seen a white man.

Illustrations by courtesy of the American Museum of Natural History.

Farm Electric Lighting by Wind Power

A Complete Lighting Plant Installed for $250

By Putnam A. Bates, E.E.

IN traveling over a vast area of country as I have in connection with my engineering work for the past fifteen years, I have encountered many interesting installations where electricity plays the important rôle.

The importance, however, is not always measured by the size of the installation, and as an illustration of this is the wind power electric plant on Mr. J. F. Forest's farm at Poynette, Wisconsin. This ingenious, but unpretentious equipment, this farmer installed himself. He set up the mill and erected the dynamo, storage battery and shafting. In fact, he did all the wiring throughout his entire group of buildings at a cost that did not exceed $250, including lamps, switches, battery cells, insulators, wire, dynamo, windmill—everything. This I call a real achievement and an evidence of the simplicity of electrical apparatus. Located as it is in a farming community about twenty-five miles from Madison, Wisconsin, this farm is no different from many in that district. The property comprises a tract of some hundred or more acres, and the "routine" is about the same as elsewhere on thousands of farms.

Mr. Forest, however, is unusual—he has the gift of imagination which enables one to see things completed before they are begun. He was watching one day an old windmill pumping water on his place, and without understanding much about electricity he made up his mind that if revolving the "armature" of a dynamo "made" electricity, this mysterious force could be produced on the farm by wind power just as it is in factories and city establishments where steam or gas engines are utilized, to furnish the initial energy.

So this farmer set about his task with a will, and the accompanying photographs show that he accomplished what he set out to do.

While there are other wind power electric plants, and Mr. Forest cannot claim the distinction of having the first such installation, his has been marked with success. And this example may well be followed by many other farmers who can appreciate the advantage of legitimate improvement. A brief description will, therefore, be of interest to those who may be contemplating a venture in this direction.

The power windmill shown (Fig. 1) is twelve feet in diameter. It is geared so that the vertical shaft makes five revolutions to one of the windmill. This shafting extends down the center of the tower and has attached to it pulleys, bevel gears and a set of grinder rings. This mill is not used for pumping, as it is "rigged" only for ordinary mechanical power purposes requiring rotary motion. The economy of such a piece of apparatus will be understood when I state that besides running the electric dynamo for which it was primarily installed, it takes its turn at operating a drillpress, grindstone, cornsheller, beehive saw, washing machine, grain elevator, and a feed grinder.

The feed grinder is of the combined foot-gear type, and as the speed dies down the rings clear themselves, leaving them in a condition to start up easily when the wind rises. A clutch is used to start and stop the grinder by itself. Above this is a spring. In case a nail or any iron is present in the grain the grinder is immediately disconnected, thus avoiding the possibility of damaging the mechanism.

An elevator lifts the grain into a large hopper above the grinder; and this also is started and stopped by a clutch.

Another feature of the grinding arrangement is a set of flour rings which will grind graham flour, cornmeal, and buckwheat flour. Connection is also made with a wheat scouring machine and a small "boiter." Thus, on this farm the miller's profits are saved. There is no teaming to the grist mill and hauling feed back again. The flour for home use is made from selected grain, and choicest ears of corn are put into meal for the "johnny cakes."

Many a farmer would do well to follow this man's example. Such a wind power is indeed worth the investment, as it aids in decreasing the cost of home living. This, however, is not what prompted its installation. Mr. Forest wanted electric light, and he went the right way to get it. These other advantages were merely "thrown in."

Many people say that a farmer cannot afford luxuries or comforts—that they cost too much for him. But, let us test this statement and see if there is any truth in it. Four acres of potatoes properly planted and cared for will yield a crop of 1,000 bushels, and the cost of plowing, planting, cultivating and harvesting will not reach $50 per acre. Assuming the crop is sold at no more than fifty cents per bushel, we can place to the profit of this little patch the sum of $300, and if the four acres is selected on a portion of the farm which generally is little used this is clear gain; consequently, the farmer can at least make improvements on that amount.

Fig. 1.—This windmill drives a dynamo which furnishes a current for twenty-four tungsten lamps.

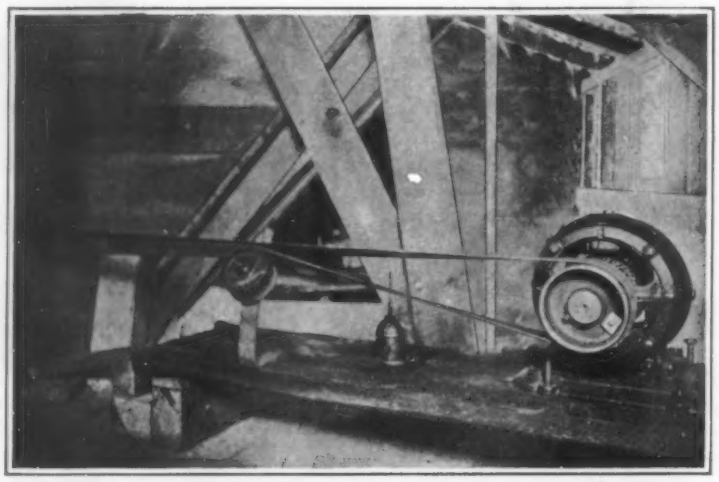


Fig. 2.—The dynamo capacity is 0.21 kilowatt. It is placed on the second floor of the mill, and driven by a quarter-turned belt from a pulley on the vertical shaft of the wind power.

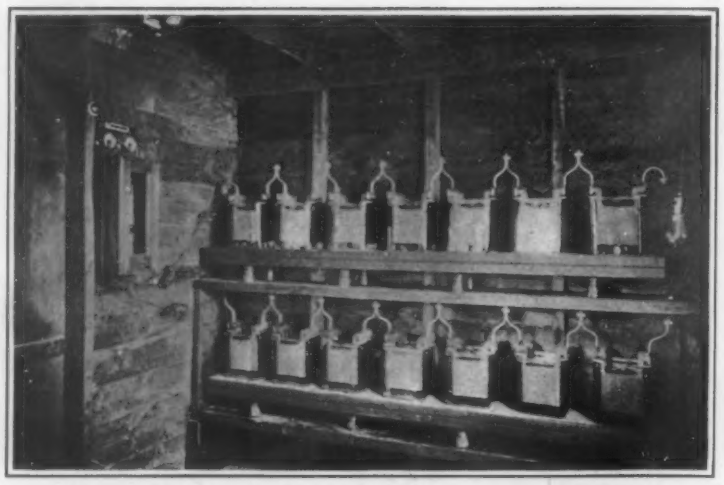


Fig. 3.—Storage battery is in the adjoining barn and accumulates energy given by the dynamo when running, and stores it for use when lights are turned on.

FARM ELECTRIC LIGHTING BY WIND POWER

The dynamo (Fig. 2) of Mr. Forest's electric plant is placed on the second floor of the barn building, which forms the base of the mill housing. Its capacity is 6 amperes at 35 volts, or 0.21 kilowatt, when driven at a speed of 450 revolutions per minute. It is run from a horizontal pulley on the upright shafting, and is operated by a clutch and quarter turned belt, passing over an idler pulley, thus doing away with the need for bevel gears.

Sometimes in a high wind the mill will "race" the dynamo, speeding it up to perhaps 600 revolutions, but to meet this condition two different sizes of pulleys have been used, making it possible to slip the belt from one to the other according to the velocity of the wind prevailing. All intermediate variations in speed are taken into consideration by the automatic control mechanism which is well deserving of mention.

There is an automatic cut-in between the generator and the storage batteries, which cuts in as the speed runs up, and again drops out as the speed slows down, thus preventing the electric current from plowing back into the generator and injuring it through a reversal of its "polarity." This cut-in, therefore, plays a very important part in a windmill driven plant on account of the sudden wind changes. The "cut-in" being entirely automatic, it is kept in a cabinet under lock and key.

The storage battery in this particular installation has fourteen cells, each cell giving about two volts, and the capacity of the battery being rated at 60 ampere-hours, or enough current for one carbon lamp for 120 hours. The battery is in a separate room in the barn, some distance from the dynamo.

When a potential of 25 to 35 volts is used for an electric system of this kind we call it a "low voltage" plant, and the lamps must be bought for this low voltage, as they were in this installation.

There are, in all, some twenty-four lamps, placed as the owner figured he would need them, and his judgment in this I find was very good. For example, he placed several lights outside the various buildings that he might see his way around and be able to direct his course accordingly. Such a provision also offers protection in the case of dealing with persons having no right to enter the premises. All these outside lamps are controlled by switches placed within, and on a cold winter's night it is not necessary to go outside when the dog barks. A turn of a switch and a glance through the window will generally be sufficient to determine the cause of any disturbance.

The Passing of the Punkah

ONE can hardly imagine the hot countries of the Far and the Middle East without the punkah, and it is something of a shock to learn from the American consul general at Hongkong that in that colony, at least, the punkah is rapidly giving place to the electric ceiling fan. Few new buildings in Hongkong are fitted with punkahs, but all are wired for electricity with reference to the use of electric fans. According to the consul general, while punkahs have many merits—especially in being easily regulated so as to maintain a gentle breeze—they entail a serious loss of light, do not promote active ventilation, as a fan does, and are hard to keep clean.

READERS are invited to contribute to this department photographs of novel and curious objects, unique occurrences, and ingenious contrivances. Such as are available will be paid for promptly.

A Curiously Eroded Stone

A VERY remarkable example of erosion is shown in the accompanying photograph. The specimen is a single piece of stone that has been ground into a fantastic shape by natural causes. The stone was picked up by an old Indian on the shores of Lake Superior last summer. It was lying, when found, in the natural pocket which formed it. It would have been most interesting to note the probable eddies which caused it to grind itself into its present shape.

An oddly eroded stone.

Photographing a Tornado

WE frequently hear of the daring of photographers who expose themselves to real dangers in order to obtain unique and interesting photographs. An example of such daring is shown in the accompanying engraving. Last May a tornado occurred in Oklahoma which devastated a section of country near Poca City, killing a number of people and destroying much property. Notice of the approach of the tornado had been telephoned ahead, which gave an enterprising photographer the chance to prepare to record the phenomenon with his camera. He took the photograph which is reproduced herewith, from a house which lay directly in line with the approach of the tornado. The picture clearly shows the funnel-shaped cloud formation. Immediately on snapping the shutter the photographer took refuge in a cave, and as the tornado came on, it completely demolished the house from which the picture had been taken.

Humane Method of Slaughtering Animals

THE accompanying photograph shows an up-to-date and humane method of slaughtering animals, which is now being used largely in England. The instrument employed is known as the Behr pistol. It is a spring-operated device that projects a sharp blade into the animal's head. No bullet enters the animals, and as no powder is used, the pistol may be placed directly upon the vital point of the skull so that the aim will be unerring, death will be absolutely instantaneous, and the animal will feel no pain. A similar instrument, but of smaller pattern, is made for use on dogs, pigs, sheep, and other small animals.

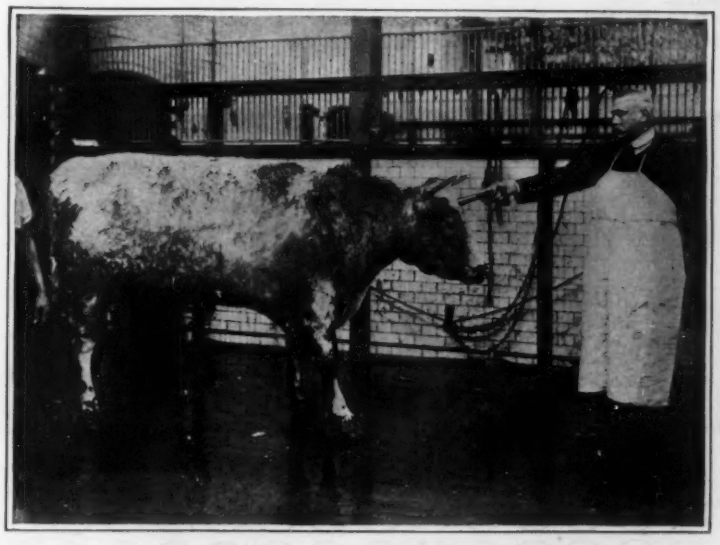
An Abbreviated Diver's Helmet

FEW people realize how utterly helpless a diver is when clothed in the ordinary diver's suit topped with the heavy brass helmet. The air that is pumped down to him fills not only the helmet, but the entire suit, puffing it out to such an extent that heavy weights are required to keep the man down. The diver cannot possibly move about like the swimmer, but must signal to the tenders above when he wishes to be raised or lowered. The gloves upon his hands are cumbersome, and the work that he can do is really very limited. One of the annoyances that he has to endure is the fact that he cannot reach inside of his suit to ease any discomfort. We have read of a diver who discovered a June bug in his helmet when he was down under water, and he was obliged to endure all the torture of having the insect crawl over his face without any possible means of reaching it to destroy it or even brush it away.

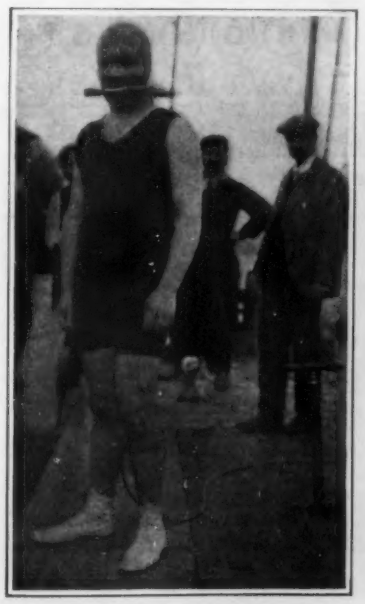
Evidently conditions such as these influenced a French inventor to devise a diver's outfit which dispenses with everything but an abbreviated form of helmet. As shown in our illustrations, the outfit consists of a cap of rubber which fits closely over the diver's head, covering his ears so as to prevent water from entering them. There is also a strap that fits over the mouth and bears the air supply device. Air is pumped to the diver in the usual way, through a pipe which is attached to his helmet at the back of the neck. Thus equipped, the diver does not require any great weight to hold him down. He can readily swim down to the work and swim up again to the surface. To assist him in descending he is provided with a weight, which he carries in his hand. This is tied to a cord, by which it may be recovered when the diver discards it. Having far greater freedom than the ordinary diver, he can do far better work under water.

A thirty-foot ice column.

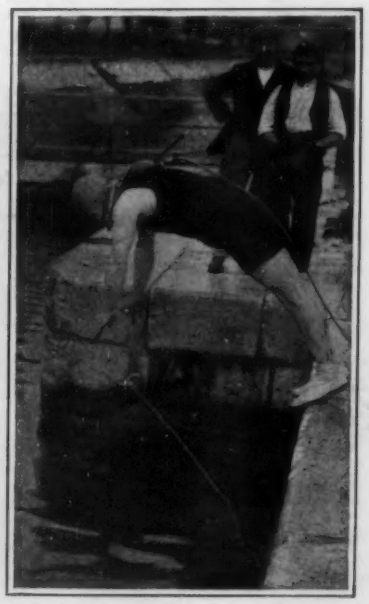
Photograph of a tornado taken from a house that was wrecked a moment later.



Slaughtering a steer with a bulletless pistol.



A simplified diver's helmet that dispenses with an inflated suit.



Diving down to the work as free as a swimmer.

A Stalagmite of Ice

IT is not often that one sees a column of ice in the woods standing thirty feet in height like a ghostly white monument. Such a column was recently to be seen in the vicinity of Schroon, New York. The column had the appearance of a stalagmite of dazzling whiteness and it proved to be a hollow pillar. The causes that gave birth to this beautiful column of ice were simple enough, although to the uninitiated the puzzle was extremely baffling. The monstrous stalagmite stood about halfway between an old stock farm and the mountain reservoir which supplied spring water to the house and barn. A vent plug was removed, permitting a fine jet of water to shoot up thirty feet into the air and gradually build up a hollow cylinder of ice. The column proved a great attraction, and created widespread interest. People came from miles around to see the curious spectacle.

Mufflers for Aeroplanes

RECENT experiments with a muffling box on board an aeroplane which were made near Paris proved quite successful. It is recognized that the great noise of the motor has its drawbacks, as it lessens the comfort in flying and fatigues the pilot as well as causes annoyance to passengers. In military work, the noise prevents the officers from hearing sounds which come from the ground, and these would often be a useful factor in observations. Pilots cannot use their voices to any extent. Another point is that were the motor silent running, the observers could hear sound signals coming from aeronautic quarters, and could also return signals to the ground, by using trumpets of different pitch or sirens as are used on vessels. The present tests were made at the Astra aeroplane establishment near Paris with excellent results, using a biplane fitted with a Renault motor of the 50 horse-power type placed toward the front. The motor has two sets of 4 cylinders each, and the gas is taken from each set by a 2-inch copper tube and is sent into a common muffling box. This last has a 6-inch diameter and 30-inch length and was taken from a Renault 14 horse-power automobile. It is mounted underneath the aeroplane, and the gas escapes from the box by a 2-inch copper tube placed so as to direct the gas toward the rear. The tests took place before a military commission, and during the flights it is said that the noise of the motor was much reduced so as to allow the pilot Labouret to speak to the persons on the ground when he was flying at 300 feet. The muffler box does not overheat owing to the strong air cooling which it receives. It is intended to use another box which is better suited for the power of the motor, and it will be mounted below the upper wing of the aeroplane. The loss of power is below 2 per cent, as shown by measurements.

A Unique Exhibition

A UNIQUE exhibition took place recently in Leipzig, Germany. An amateur of Chemnitz has built up the battle of St. Privat in all its details with the aid of 14,000 tin soldiers. To give an idea of the work required, it may be mentioned that it took fully six years to complete the grouping.

Inventions New and Interesting

Simple Patent Law; Patent Office News; Notes on Trademarks

An Electrical Scoreboard

A NEW scoreboard has appeared, a very large apparatus with figures and names of such dimensions that they may be plainly read from long distances, the face board being 16 feet square. In the center of this is a well defined field, 8 feet square, of copper wire, painted green, with the "diamond" of light brown. Beneath this field a thousand lights are so ingeniously arranged that a continuous line may be described to any part of the field. Thus any combination of movements of field men (in white lights), of player (in green lights), and of the ball (in red) may be shown, all working simultaneously, the different colored lights assisting in the quick understanding of the "play."

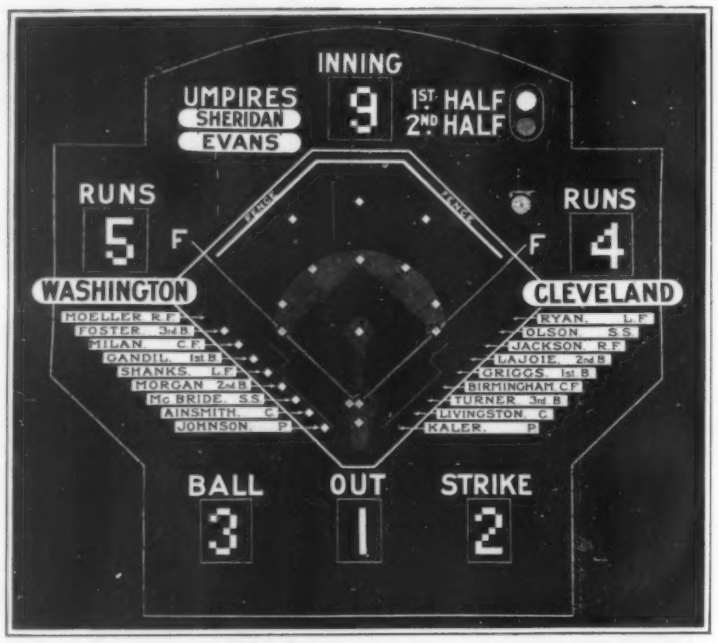
The unique feature of the electrascore and the one which marks it as essentially different from other similar devices, is that the ball and the players are in constant and actual movement all the time. It is not merely a jump from base to base, etc., but a line of light showing the path of the men is flashed across the field. In like manner the course of the ball is followed from pitcher to batter, into any field, to any fielder or baseman, etc.

Beyond the screen field the face board is taken up with boxes for innings, balls, strikes, etc., in figures of lights fully 14 inches tall. The half innings are designated by a big light. The names of the men of the contesting games are amply large, beside which stands a "lightman" to designate those who will be called to the bat. The other team is dark until its time arrives to take the bat. When a man is called to the bat, the "lightman" at once proceeds to walk from his name in an actual path to that post. From this it may be readily realized that 1,500 lights of four candle power were none too many in the construction of this invention.

The rear of the board is a marvel of condensation of levers, switches, stops, etc., for making connections with figures, the ball and the man. The many thousands of feet of wire combining the various lights are gathered in several heavy cables and then redistributed to their proper points of contact. The operator plays the game on a miniature copper scoreboard, making the contacts for movements with the stubs. This may be considered a replica of the field on the face board.

The economic and convenient arrangement of the scoreboard is one of its merits. Twenty-three thousand feet of wire traverse the device in a skillful manner. The entire weight is estimated at a ton. The face board stands up-right, with the rear construction, though amply large, well concealed from the spectators. The voltage necessary may vary from 210 to 220, with the latter preferable.

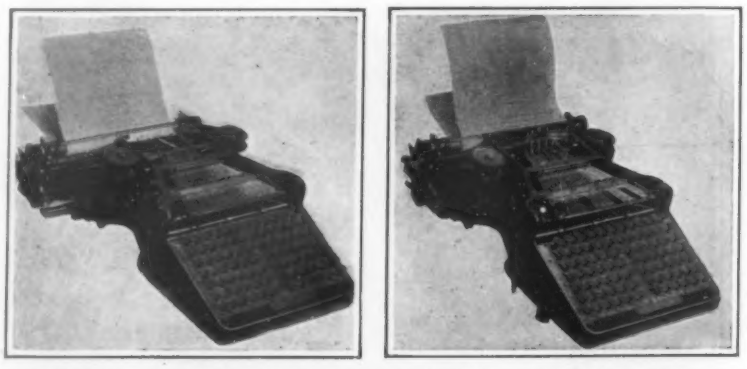
The easy manipulation has simplified matters for the operator, despite the fact that so much is described on the face.



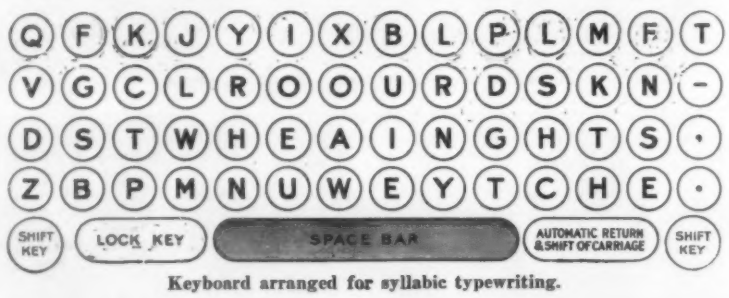
An electrical story of the ball game.

The invention is provided with telegraphic connections, which may come direct from the field of the game or a local wireless station.

While the Nokes electrascore is perhaps best appreciated in a theater, where it may be readily adjusted for exhibition purposes, it may also be set up in the open, if given sufficient space. It is scarcely possible to suspend the device on the outside of a newspaper building, as most of the smaller score boards are done at present.



Syllabic typewriter at rest and in the act of printing a four-letter syllable.


Q F K J Y I X B L P L M F T
V G C L R O O U R D S K N -
D S T W H E A I N G H T S .
Z B P M N U W E Y T C H E .
SHIFT KEY
LOCK KEY
SPACE BAR
AUTOMATIC RETURN & SHIFT OF CARRIAGE
SHIFT KEY

Keyboard arranged for syllabic typewriting.

In other devices of this character, the aim has been to give the *result* or *final* of a movement of a man from base to base or the course of the ball from the pitcher to the batter or one man to another. As to the details which bring about this result, the baseball fan at the scoreboard is ignorant until he reads the newspaper. The electrascore, however, accomplishes this through the maze of lights under the screen field. It is this feature that causes the fascination for this counterfeit game. Especially is this true when baseman, player and ball are having one grand scramble to gain the point, on which may hang the victory or failure of a team.

Machine for Typewriting by Syllables

THE idea of syllabic typing must be as old as the idea of the typewriter itself. Our words are made up of syllables uttered singly or in combination. Each syllable represents a single vocal impulse. Why not print the entire syllable at a single manual impulse, permitting the separate fingers to take care of the separate letters which are combined to produce the syllable. If this could be done it would take less time to typewrite a thing than to speak it, particularly if the machine could be arranged to print even more than one syllable at a time.

A rather promising machine of this type has recently been brought out by an Italian inventor, Mario Schiesari, of Turin. Reproduced herewith is the arrangement of the keyboard. The keys for figures, punctuation marks and various other symbols are not shown, although they are provided in the machine.

In operating this machine the typist works from left to right. The type are arranged in groups on sectors and all the characters arranged in a single vertical row on the keyboard are to be found on a single sector. Thus, taking the first row which consists of the Q, V, D, and Z, it would be impossible to print both Q and D by depressing the key in the first vertical row. To print QD it would be necessary to depress Q in the first row with the left hand and D in the tenth row with the right hand. To write the word "owe" the typist depresses the key O in the sixth row, W in the seventh row and E in the eighth row. It will be observed that the keyboard is so arranged that practically any spoken syllable may be typed at a single stroke. Where this is impossible the syllable has to be divided and printed in two strokes.

The number of letters which may be typed at a single time depends upon the number of sectors. If one had fingers enough he could print an entire horizontal row of keys at a single operation. However, ordinarily an eight-lettered syllable, such as the word "thoughts" represents

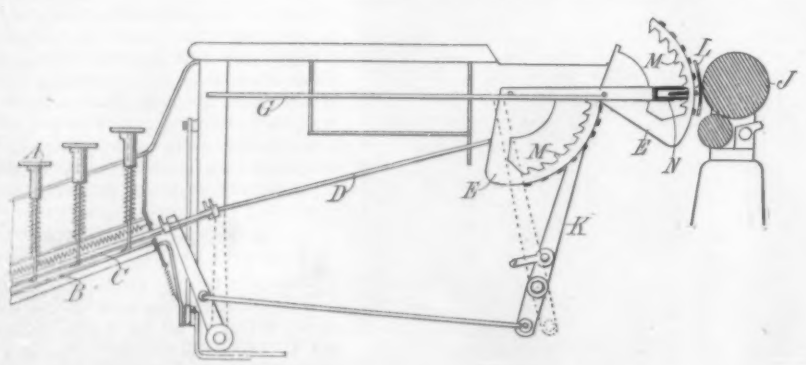


Fig. 1.—Details of the key action and type sectors.

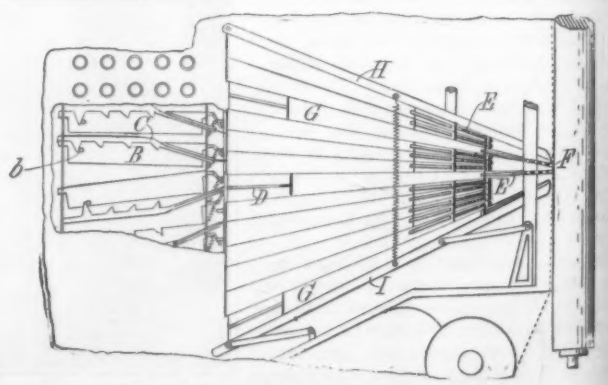


Fig. 2.—Plan view showing the tapered slides.

the maximum extent of a single printing. The printing is not done when the keys are depressed but when they are released. It is not necessary to strike all the letters of a syllable at the same instant. The keys may be depressed successively. As each key is depressed it turns the sector until the corresponding character is to be brought up to the printing position. The depressed keys will be held automatically in set position until the last key is released. Then, as all the keys return to normal position, the printing of the entire syllable will be accomplished and the carriage will be moved correspondingly to receive the next syllable of the word. When the last syllable of a word is struck the space bar must also be depressed, so as to allow for the space between the words.

Part of the mechanism employed in the syllabic typewriter is shown in the accompanying drawing. When the key *A* is depressed it rocks the plate *B*, removing a pin *b* from contact with a tooth on the sliding plate *C* and permitting the latter to move forward under action of a spring until one of its teeth engages with the stem of the key. By referring to Fig. 1 it will be observed that the lower end of the stem is bent to form a hook which catches under the tooth referred to, and holds the key in depressed position. The forward movement of the slide plate *C* is communicated through the rod *D* to the type-bearing sector *E*. The relative position of the stem of the key and the tooth on the plate *C* that engages it is such as to swing the corresponding type on the sector *E* to the printing position. By referring to the plan view (Fig. 2) it will be seen that each sector is carried by a slide *D* of tapering form, so that the entire series presents the form of a fan. When a slide *G* is moved forward, carrying the sector to the printing point, owing to its tapering form it crowds to the right all the slides *D* that lie on the right. The slides are prevented from moving to the left by a fixed bar *H* while the bar *I* on the opposite side is yielding and is connected by a pair of links to the frame of the machine, so that when it is displaced from normal position, it has a parallel motion. Any number of the slides *D* may be moved forward to the printing point, causing the bar *I* to yield correspondingly. The taper on the bar *D* is so chosen that the displacement to the right causes the sectors to come to the printing point *F* side by side. On release of the last key, the sectors are moved simultaneously against the platen *J* by means of a bar *N* and arm *K* which are actuated either by a small electric motor or, as in the model illustrated, by a spring motor. Just before the type strike the paper an inking ribbon *L* is swung up between the platen and the sectors. It will be observed that the sectors *E* are provided with notches *M* which are adapted to be engaged by locking bar *N*. This insures proper alignment of the type. The ratchet mechanism that moves the carriage to the left is controlled by the movable bar *I* and hence will move the carriage through a space equal to the number of characters printed. As a motor is used in connection with the machine, power is used to return the carriage to the right for a new line, on depressing a carriage shift key.

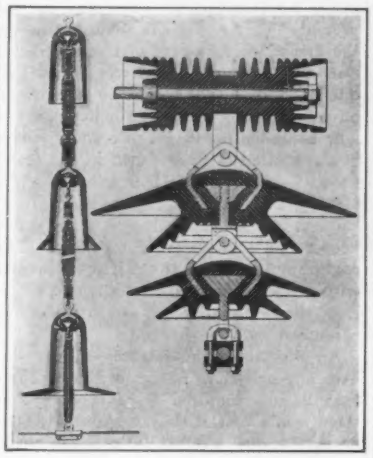
Graded Suspension Insulators

To the Editor of the SCIENTIFIC AMERICAN:

In an article entitled "Some Problems of High Voltage Transmission," which appeared in the proceedings of the American Institute of Electrical Engineers for March, 1912, Dr. Charles P. Steinmetz states:

"With a number of equal insulating disks sharing the voltage between line and ground, the potential difference across the insulators nearest the line is higher, and the potential difference across the insulators nearest the ground is lower, than the average potential difference per insulator, the more so the greater the number of insulator disks." Also, "From this it appears that the use of a large number of small insulator disks is uneconomical at very high voltages, and a few large disks of high disruptive strength are preferable." Also, "To extend the insulating possibilities of the suspension insulator type far beyond the voltages now contemplated, therefore, requires a *grading of the insulator disks in their capacity*, so that the disk nearest the line has the highest, that nearest the ground the lowest capacity, or the addition of capacity at the surface of the insulator disks, in proportion to their distance from the ground."

Illustrated herewith are two forms of high-tension insulators which have been patented by the writer. These were filed, respectively, on September 23d, 1907, and December 4th, 1909. They disclose that as early as 1907 the writer understood and appreciated the value of graded suspension insulators for high-tension current. It is now conceded by many of the



Types of graded suspension insulators.

foremost electrical engineers that insulation of the graded suspension type is the best practice, as it insures reliability and continuity of service, under the most adverse conditions, providing means at the same time for keeping the line in operative condition even though direct lightning strokes should reach it.

Brooklyn, N. Y. LOUIS STEINBERGER.

Notes for Inventors

Geographical Index for Clocks.—In patent No. 1,034,496 Jean B. Olinger of Milwaukee, Wis., provides an attachment for clocks for showing upon an ordinary dial the hours for various principal points or countries all around the earth. The present invention is an improvement upon one shown in a former patent and includes a dial in the form of a star having twelve arms or rays. It is adapted to be attached to the hour-arbor and each of the arms carries at its extremity an index which guides the eye to the proper point of the clock-dial to give the time at the point to which the arm or ray is appropriated.

A Bottle That Has a Measuring Spout.—Meredith Clark of Garden City, New York, in patent No. 1,034,424, combines a measuring device with a bottle neck. It is in the form of a spout secured to the neck and the measure is so pivoted with relation to the spout that the bottle can be tilted in one direction to pour into the measure and in another direction to discharge the contents of the measure.

Patents for Treating Starch.—A series of patents, No. 1,035,829 to No. 1,035,842, have been issued to Alexander P. Anderson of Chicago, Ill., relating particularly to the art of treating starch materials, starch, flour and flour products. Some of the patents relate to the making of starch pebbles, some to the art of puffing starch containing flour and some to the treatment of cereal grains.

A Filling for Vehicle Tires.—Rudolf Zimpel of Gross-Lichterfelde, near Berlin, Germany, has secured patent No. 1,036,170 for a mass for filling the tires of vehicles. The mass is composed of glue, linseed oil, shark oil and alum.

RECENTLY PATENTED INVENTIONS.

These columns are open to all patentees. The notices are inserted by special arrangement with the inventors. Terms on application to the Advertising Department of the SCIENTIFIC AMERICAN.

Of Interest to Farmers.

FEED BOX.—A. W. WENDORF and O. F. SAMPE, Chill, Wis. This invention provides an inexpensive long lived box of plastic material, so constructed as to prevent wasting of feed while permitting the entire contents to be got at. Use of the rib will prevent wasting of the feed in the box by the stock, and the animals cannot throw or injure the box which is of plastic material.

Of General Interest.

NON-REFILLABLE BOTTLE.—L. ARNAVAT, Tampa, Fla. An object in this instance is to provide a device which will permit the liquid within the bottle to flow out whenever it is desired to use it, by the mere act of tipping the bottle, but which will prevent the introduction of a liquid from without.

MOUTH GAG.—E. T. KREBS, P. O. Box, 378 Carson City, Nev. The object here is the provision of a device which may be easily inserted and removed, which will hold the mouth well open without causing pain or injury to the patient, and will leave the hands of the operator free, and which carries a tongue depressor and an illuminating means.

DOWEL.—H. HARRILD, 73 So. Maple St., Spokane, Wash. This invention is an improvement in dowel construction, having for its object to provide a novel construction whereby to avoid the necessity of mortising and tenoning in doors, sash or other wooden frames and to provide a novel construction for holding together any wooden joint.

PROCESS OF MANUFACTURING SUBSTITUTES FOR OILS, CAOUTCHOUC, RESINS, AND THE LIKE.—L. LILIENFELD, Zeltgasse 1, Vienna, VIII, Austria. All products obtainable according to this invention may be used alone or mixed with other materials. The union of the products made with one or more other materials and softening agents may be effected by mixing or kneading without the use of any solvent, or the product dissolved and the solution mixed with other material in an undissolved or dissolved condition. The products are insoluble in water, but they may be incorporated with aqueous solutions of many binding agents. This may be necessary for those binding agents which are not soluble in solvents that dissolve the products.

PROCESS FOR FINISHING, FILLING, LOADING, OR DRESSING TEXTILE FABRICS AND SPUN GOODS.—L. LILIENFELD, Zeltgasse I, Vienna VIII, Austria. For carrying this process into practice crude viscose or viscose purified according to one of the well-known processes, e. g., those using salts, weak acids and salts, alcohols, weak acids and alcohols, other agents which withdraw water, bisulfite lye, sulfuric acid, carbonic acid and other weak acids and the like, and possessing a certain percentage of alkali, is applied by hand or by means of suitable machines onto the fabric or spun goods to be finished or is incorporated therein.

UMBRELLA HANDLE.—G. TESTA, care of G. Linde, 23 John St., New York, N. Y. This invention provides a handle movable on the cane of the umbrella to form a tip retainer for the folded ribs; provides a means for maintaining the handle in adjusted position on the umbrella cane; and provides an attachment for umbrella handles to adapt the same for transfer from one handle or umbrella cane to another.

COMBINED CALK PLATES AND CARRIER.—G. S. MEYER, Newburgh, N. Y. This invention relates to attachable calks and means for attaching the same to an ordinary horseshoe. It is an improvement on the device forming the subject of a previous patent granted to Mr. Meyer. The present invention provides means to resist the tendency of the calk plates and their carrying frames to bend and turn sidewise under strain of service.

DENTAL APPARATUS.—F. E. BUCK, Forsyth and Main Sts., Jacksonville, Fla. The object here is to provide an easily operated device, wherein a holder is provided having a perforated bottom, and mounted to permit a maximum adjustment, both laterally, angularly and vertically, and wherein any adjustment may be made with one hand, and with a single handle.

CONCRETE MOLD.—C. H. F. DYHRKOPP, 545 Miller Ave., Spencer, Iowa. This invention provides a mold having upright posts for supporting the mold boards, secured together by ties which are tapering, so that they can be readily knocked out without disturbing the material of which the wall is formed, and further, so that they can be replaced in the openings thus formed readily without jamming.

CHAIN LINK.—W. D. TUSTEN, 757 Macon St., Brooklyn, N. Y. This improved chain comprises a number of links made in sections movable with respect to each other to permit the chain to be distended whenever desired; as, for instance, to permit the length of the chain to be increased when it is to be used in the form of a bracelet or armlet, so as to enable it to be slipped over the hand into position.

COATED METAL WIRE RUBBER FABRIC.—R. M. BISSELL, care of Mrs. R. M. Bissell, Valcour, N. Y. Among the principal objects which the present invention has in view are: to provide an air and waterproof fabric having a reinforcing metal structure; and to provide in a fabric of the character mentioned a metal puncture resisting surface.

Hardware and Tools.

TRUNK LOCK.—J. BREWER, 220 E. 89th St., Manhattan, N. Y., N. Y. Mr. Brewer's invention has reference to trunk locks and parts associated therewith, his more particular purpose being to provide a cheap, simple, and efficient mechanism for preventing easy access to the interior of the trunk, or the like. It may be employed to secure the lid of any box or receptacle or even upon doors if need be.

SCREW DRIVER.—F. A. TIBBALS, 1026 Main St., Monmouth, Ill. This invention is an improvement in that class of ratchet screw drivers which are provided with a lever attachment adapting them for very heavy work and for use in angles or places where it is difficult to operate an ordinary screw driver.

ALINING PLATE FOR FLOOR HINGES.—O. KATZENBERGER, care of Lawson Mfg. Co., 215 W. Huron St., Chicago, Ill. The aim here is to secure registry between the free vertical edge of the door and the central portion of the door jamb when the door is in closed position, without depending on the screws in the floor plate for the proper adjustment.

COMBINED LEVEL, PLUMB, AND GRADE FINDER.—D. W. L. FRANK, Sr., 2024 W. Harrison St., Chicago, Ill. An object here is to provide a device which will combine in one instrument several different instruments for use in finding levels, grades, directions, etc. Means provide for finding grades or determining the angles of slopes, by use of an "inclinometer" in connection with the level, compass, etc., and for protecting levels from dust and injury, and at the same time for magnifying these spirit levels.

CORKSCREW.—E. EARLE, care of Earle Bros., Townville, S. C. In this case the object is to provide a simple and easily operated device especially designed to prevent the screw from slipping or pulling out of the cork, or the pulling off of the top of the cork, leaving the inner end of the cork in the bottle.

PIPE WRENCH.—W. L. BESSOLO, care of G. Galagher, Los Angeles, Cal. The handle proper is hinged to the shank of the fixed jaw, a ratchet device being applied at the joint to operatively connect the handle and movable jaw and cause the jaws to open more widely or grip an object more firmly, according as the handle is pushed or pulled in one direction or the other. In this case the invention is embodied in the construction and combination of a ratchet and pawl operative by connecting the handle and movable jaw.

HOSE CLAMP.—A. L. P. PERRY, P. O. Box 175, Roanoke, Va. This clamp has a practically uniform bearing surface around the entire hose. The device is devoid of any cutting edges such as tongues, or the like which are apt to injure the hose and cause it to wear out sooner than it otherwise would.

Machines and Mechanical Devices.

HOTEL REGISTER.—J. W. THOMPSON, Portland, Ore. In this instance use is made of a casing having a display opening for the passage of the web passing over a bed-plate and winding on rollers arranged within the casing, a motor located in the casing, and a specially constructed gearing driven by the said motor and adapted to be moved into driving engagement with either roller, to impart a traveling motion to the web in either direction.

NOTE.—Copies of any of these patents will be furnished by the SCIENTIFIC AMERICAN for ten cents each. Please state the name of the patentee, title of the invention, and date of this paper.

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Cudahy Packing Company	Remington Typewriter Company
Diamond Rubber Company	Russian Government
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A 10,000-ton Motor-driven Ship

(Concluded from page 260.)

that with revolutions of from 140 to 145, there was a gain of only three revolutions while the propellers were out of the water.

The ship carries 1,000 tons of oil in her double bottom. She left Hamburg with a supply of 470 tons and reached Havana with 290 tons, having run at full speed with a fuel consumption of about 10 tons per day. The engines, being new, were run at only 135 revolutions per minute for the first few days; later this was raised to 142 revolutions. The best day's run was 329 miles, at an average of 13.3 knots per hour. It is expected that when the engines are shaken down the ship will be good for an average speed of 13 knots.

The fuel consumption for the main engines and all auxiliaries worked out at 0.34 pound per indicated horse-power per hour. Outside of this economy in fuel consumption, the adoption of the oil motor for transatlantic ships such as this presents many and great advantages. In the first place, in a ship of this size, 1,000 tons additional of freight can be carried, due to the fact that the space that would have been given up to the boiler plant is now available for cargo. Secondly, there is a reduction of fifteen men in the crew, namely, six stokers, six trimmers and three oilers. The present engine room force consists of seven engineers, one storekeeper and one electrical engineer. The engines ran throughout the trip to Havana with great regularity and without a single stop during the whole seventeen days consumed on the voyage.

An estimate of the economy in this ship over one driven by steam engines, shows that in one hundred days of operation there would be a saving of about $13,000, or say, about $50,000 in a single year.

A New Principal Examiner

HARRY C. ARMSTRONG, until recently first assistant examiner in Division Three of the United States Patent Office, has been appointed primary examiner in charge of Division Eleven, the vacancy thus filled having been created by the recent death of Edward H. Eakle, former principal examiner.

Mr. Armstrong was born in Indianapolis, but removed with his parents at the age of twelve to Massachusetts, attended the excellent schools of that State, and completing his studies at the Worcester Polytechnic Institute.

After a useful experience in the works of the Washburn & Moen Co., Worcester, and the Thomson-Houston Electrical Company at Lynn, he was appointed an assistant examiner in the Patent Office in the summer of 1894, and has passed through the various grades to his present high position.

Mr. Armstrong, on entering the Patent Office in 1894, was assigned to the class of metallurgy, and has remained in the division, having charge of such subject throughout his entire eighteen years of service, having during such period an opportunity of observing many of the remarkable advances made in the steel and allied arts during the time mentioned. The metallurgical art, concerning itself mostly with the production of iron and steel in all its untold ramifications, it is needless to say, calls in its examination for more than ordinary skill, knowledge and judgment. How well Mr. Armstrong has acquitted himself, in charge of important subject, can be estimated by the high regard in which his abilities are held by his co-workers, superiors and the attorneys having dealings with him.

On two occasions Mr. Armstrong has been assigned by the Commissioner of Patents to important missions, representing the Bureau at the Patent Office exhibits displayed in the Seattle and Jamestown Expositions.

The new duties Mr. Armstrong is called upon to perform bring him into contact with the perplexities with our intricate shoe machinery as well as the manufacture of harness and other leather articles and boots and shoes *per se* and open up a large and interesting field of labor.

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PATENTS

If you have an invention which you wish to patent you can write fully and freely to Munn & Co. for advice in regard to the best way of obtaining protection. Please send sketches or a model of your invention and a description of the device, explaining its operation.

All communications are strictly confidential. Our vast practice, extending over a period of more than sixty years, enables us in many cases to advise in regard to patentability without any expense to the client. Our Hand Book on Patents is sent free on request. This explains our methods, terms, etc., in regard to PATENTS, TRADE MARKS, FOREIGN PATENTS, etc.

All patents secured through us are described without cost to the patentee in the SCIENTIFIC AMERICAN.

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The Motor-driven Commercial Vehicle

This department is devoted to the interests of present and prospective owners of motor trucks and delivery wagons. The Editor will endeavor to answer any questions relating to mechanical features, operation and management of commercial motor vehicles.

Saving Three Thousand a Year in Ferry Tolls

SERVICE, better service than can otherwise be secured, is the keynote of the motor truck's widespread success. In most cases where they are used, however, they show more or less economy over horses which formerly did their work. In some instances this economy is secured in novel ways, and the following is a good example.

A Jersey City milk company has to haul a large quantity of milk every night to a point in the interior of Staten Island. A motor truck is now used, and it makes two trips each night, carrying on each trip one hundred forty-quart cans, each weighing 110 pounds. The present route covers a run of eight miles from the distributing station in Jersey City to the Bergen Point ferry, and a run of two miles after reaching Staten Island, making a round trip of twenty miles, or forty miles for the night's work. The ferry tolls are thirty-five cents for each passage, or a dollar and forty cents per night.

It was impossible for the horse teams which formerly did this work to take this route, because they could not cover the ten miles over steep grades fast enough to deliver the milk on time. Consequently, two teams were sent from the distributing station over the Erie Railroad ferry to New York, the toll being a half dollar for each team. From there it is a mile to South Ferry, and the toll on this ferry to Staten Island was seventy-five cents for each team. Thus the ferry tolls amounted to ten dollars a night, for two round trips for two teams, against a dollar forty for the motor truck. As this delivery has to be made every night in the year, the saving effected by the motor truck is $3,139 a year. As the motor truck displaces four horses, it undoubtedly effects an additional saving in this direction as well.

Motor Delivery of Furniture

A "SWINGING LOAD" of furniture, or one that projects beyond the tailboard of the van, will usually weigh anywhere from 2,000 to 2,500 pounds. We refer to new furniture and not the heterogeneous and solidly packed household effects to be found in the moving van. A load of 2,500 pounds can easily be managed by a team of horses on ordinary city streets, and, so far as load is concerned, there appears to be no advantage in substituting motor trucks for the horse-drawn vehicles; because the material is so bulky that the motor van cannot be more heavily loaded than the horse van.

In the delivery of furniture most of the time consumed is not in travel upon the road, but in the packing of the furniture to the best advantage and so that it will be readily accessible, and more particularly in the delivery of the furniture. Tedious waiting for the freight elevator seems to be the rule rather than the exception. At the height of the furniture season the moving man is constantly found in possession of the elevator. Thus, it is common to reckon the packing, transporting and delivering of a "swinging load" of furniture as a full day's work. A motor vehicle, because of its higher speed, could not possibly save enough time to permit of sending out two loads per day. However, when it comes to long distance delivery, the motor truck shows up to better advantage.

Owing to competition with department stores, a large furniture house in New York found it necessary to extend its free deliveries to a radius of about fifty miles from the city. This used to be done with teams, and any distance of more than twenty miles was considered a two-day trip and called for the board and lodging of the teamster and his helper and the horses at some inn over night. Last spring two first-class gasoline trucks were purchased for the suburban deliveries. Since then the company has been carefully weighing the relative efficiency of motor and team delivery. While the statistics are not yet complete, the motor vehicle has undoubtedly shown its superiority to the horse-drawn van. With the motor truck round trips of 65 to over 100 miles per day are easily taken care of. The record of one of the motor trucks for the month of August was 1,163 miles for twenty trips, some of which were as much as 105 miles long. The total number of stops for the month was 166, and the average running time for the entire period, 8.8 miles per hour. A single motor truck did more than twice the work of a horse-drawn van, and the over-night expenses out of town were saved.

To drive the motor truck, an experienced chauffeur at $20 a week was required as against $15 per week for the ordinary teamster. The driver of a van is usually accompanied by a helper receiving $12 a week, whereas an experienced teamster is required on the motor truck to assist in packing, routing and delivering the goods. Thus, the expense for labor in connection with the motor truck is $35 per week as against $27 for the horse-drawn van. This extra expense, however, has been outweighed completely by the excellent work of the motor truck. It is a decided advantage to have the entire delivery completed in a single day so that the men and machine are always housed at home. Quite aside from the saving in cost there are other important considerations that must enter into the reckoning. A motor truck always looks better, gives a better impression, and is liked better by the customer than a horse-drawn van.

The company has come out unqualifiedly in favor of the motor for long hauls, but still prefers to use the horse for city delivery. However, it has made no experiments so far with electric trucks which have proved highly efficient for city deliveries in many and varied lines of business.

Light Trucks With Pneumatic Tires v. Heavier Vehicles With Solid Tires

By G. H. Bryant

THOSE manufacturers of commercial motor vehicles who have stuck to the light-weight truck with pneumatic tires present some very strong arguments in defence of their production. It is claimed that a light truck is much more efficient in every way than a heavier truck, which, in most cases, uses solid tires, while the lighter vehicle can easily use pneumatic tires.

An interesting test was made during the past year by the Fuhrmann-Schmidt Brewing Company of Shamokin, Pa. The test was made with a light one-ton truck equipped with pneumatic tires and a seven-ton truck with solid tires. The trucks were pitted against each other for one day's work. The one-ton truck loaded, hauled and unloaded fourteen loads of beer of fourteen half-barrels each trip, or a total of ninety-eight whole barrels. The seven-ton truck hauled, in three trips, ninety-nine barrels, carrying but one more barrel than the lighter truck. The one-ton truck was managed by one man, who both loaded and unloaded it. The seven-ton truck needed three men to manage it. The expense of the running of the one-ton truck and one man's time was considerably less than that of the seven-ton truck with three men's salaries to be paid.

Satisfactory tire service with an auto-

Pick your tires as you would your trucks

Suppose you were offered a truck that carried with it a definite guaranteed cost per mile of service—a lower cost than you had ever known a truck to be operated on before. Would you consider such a truck a safe investment?

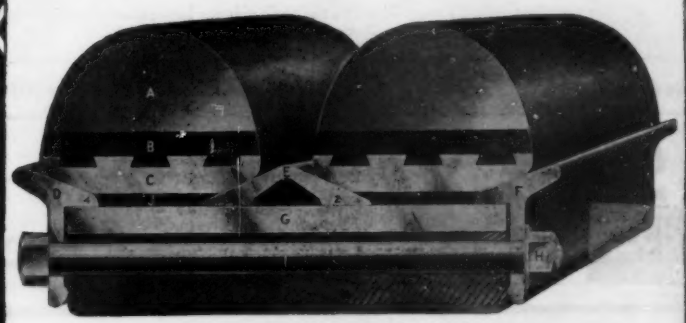
If, in addition, you were positively assured that your deliveries would never be delayed a single hour on account of repairs or adjustments—

If you were shown that the truck was so extremely simple that the driver could do all the necessary repairing himself—

If you found that doing away with the necessity of repair shop assistance gave to the truck practically an unlimited radius of action—

You would probably buy that truck.

You may not be able to secure such a truck at present, yet it is a fact that *today* you can at least buy motor truck tires that actually do possess these same points of superiority.



Cross section view of United States Motor Truck Tire

A—Tough Rubber Tread
B—Hard Rubber Base
C—Metal Base
D—Inside Flange Wedge Ring
E—Center Wedge Ring
F—Outside Flange Wedge Ring

DIRECTIONS FOR USING

Remove locking nuts "H." Outside flange wedge ring "F" slips off easily, after which the outside tire, the inside center wedge ring "E" and the inside tire may be easily removed. No pounding, prying or jerking is necessary. Only three movable parts. "E," "F" and "D," one of which ("D") always remains in place. All rings are split rings. This absolutely prevents freezing.

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UNITED STATES
MOTOR TRUCK TIRES

Are absolutely guaranteed for 10,000 miles of service conditional upon its being used within one year's time. Such a guarantee was never heard of before the advent of this remarkable tire.

Delivery delays are done away with. Instead of being compelled to tie up your deliveries for a day or two while a wheel is being sent away to some distant repair shop for a tire replacement, you may now make a tire change (even a dual tire) in your own garage in fifteen minutes' time.

Repair expense is abolished. The driver is now the tire repair man. A hammer, a wrench and two hands comprise a complete tire repair shop equipment.

Radius of action unlimited. Instead of being tied down to a tire repair shop, a truck carrying a spare United States Tire may now go anywhere that gasoline can be bought.

Possessing these distinct points of superiority makes the selection of United States Tires absolutely imperative to every truck owner who is bent on getting his operation cost down to rock-bottom.

United States Tire Co.
New York

926 G. V. Electric Trucks are operated by 25 firms

That's an average of 37.1 per customer. 100 firms use over 1300 G. V. Trucks. A horse and wagon is a horse and wagon, nothing more. An Electric Truck on the contrary may dump coal, hoist safes, warp its load on with a winch operated by its own battery, pump water from a deep manhole, tow a dead trolley car around the curve or take its load across the floor of a great loft after car and all have been taken up in the elevator. It shows better than anything else the possibilities of the new way of moving raw material and merchandise.

American Express Truck
One of 85 G. V. Trucks used by American Express Company

Let's forget the word "Automobile" and substitute "Transportation." Making Motor Trucks pay is a big, big science. The Electric for the city and the gasolene truck for long distance work beyond the radius of the Electric is the story. Efficiency engineers will soon tell you the same.

Scores of our 1902-03 models are still running, many of them working side by side with our 1912 product in these big fleets. Our newer trucks are standardized, have interchangeable parts, more mileage, low depreciation, low operating costs. 69.5% of 1911 business reorders. Age, prestige and ample capital back of everything we build.

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The Adams Express Co. is operating about 400 electric trucks equipped with Edison Storage Batteries as compared to about 30 equipped with other batteries—this *after a test lasting nine years.*

Points to remember about the Edison Battery when purchasing an electric truck are: Light Weight (a saving on tires) and Long Life; No injury from short circuiting, overcharging or from being left standing indefinitely in a charged or discharged condition; Low maintenance cost; No expert attention required; Operation and care simple.

Let our experts give you advice as to your battery equipment—don't hesitate to ask us questions.

You can see Edison Batteries being manufactured at the Boston Electric Show, September 28 to October 26, 1912.

The Edison Storage Battery Company
132 Lakeside Avenue, Orange, N. J.

mobile is merely a matter of proper construction and proper tire size. Hudson Maxim, the noted inventor, says, "If the load on pneumatic tires never exceeds the elastic limit of the rubber it will endure a very long time, whereas if loaded but slightly beyond the elastic limit, they soon go to pieces."

In overcoming tire troubles three things have to be considered: weight of the car, the size of the tires and the riding ease. The makers of the light trucks using pneumatic tires have in every way made light weight the strong point of their construction, using full-elliptic springs and a flexible frame to aid the tires in absorbing road shocks. On a car with a rigid frame and stiff springs all the cushioning of the road shocks must be borne by the tires. Consequently, the rubber and fabric are unduly strained and break down before their time.

That light weight has a marked influence in prolonging the life of the tire equipment is supported by results of careful experiments made by Michelin, the noted tire manufacturer. These experiments have proved conclusively that every five per cent increase in the weight of an automobile adds fifteen per cent to the wear on the tires. Hudson Maxim declares that every twenty-five per cent decrease in the weight of an automobile means one hundred per cent added tire service.

Pneumatic tires and resilient shock-absorbing construction overcome the destructive action of driving over rough streets and permit a good average speed which is necessary in efficient truck service. Not only do they save on the repairs of the car, but they take better care of the load carried, not causing it to endure a perpetual succession of severe road shocks. Pneumatic tires make the truck ride more easily, and it does not soon become a rattling old vehicle like many of the old-time horse trucks.

Subsidized Motor Trucks

By John R. Eustis

FRANCE was the first nation to recognize the motor truck for army transport service and has developed a subsidy plan which has been largely followed by the other governments. Under this plan the French government has now at its command in case of war upward of 2,000 motor trucks, or the equivalent of at least 12,000 horses or mules. These motor trucks are regularly engaged in private service, and the owners receive from the government for each vehicle six hundred dollars at the time of purchase and two hundred dollars for each of the three following years, a total of twelve hundred dollars. In return the owner agrees to keep the truck in good running order and to turn it over to the government, with its driver, any time on demand.

Motor trucks eligible for this subsidy must, however, be adapted for army transport service. There are held annually in France, under the direction of the War Department, trials in which all manufacturers of motor trucks are invited to participate.

Motor trucks which have qualified in these annual trials sell much more readily than those which fail or which did not participate. The manufacturers, therefore, spare no efforts to win, and the engineering and commissary departments of the French army do their best to make the requirements sufficiently severe to show up any and all weaknesses.

This year's trials have just ended. Sixty-two trucks participated, representing thirty-two distinct models, made by sixteen different manufacturers. They were under military supervision and observation for an entire month, during which they made twenty daily runs over routes radiating from Versailles, the total distance being 1,558 miles for single trucks and 1,225 miles for trucks hauling a trailer. The runs had to be made under full load, both singly and in convoy formation, without load, and with gasoline, benzol and alcohol as fuels. An officer rode on each truck as observer, and a careful record kept of fuel and oil consumption,

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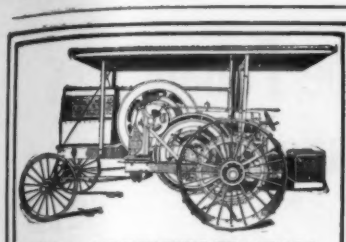

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as economy of operation played a part in the final award.

Following the road trials a careful examination was made of every part of each truck. One or more important units on each truck were dismounted, such as rear axles, jackshafts, gear boxes, road wheels, motors, and steering gears.

The French motor truck industry is greatly benefited by these annual trials. The army service requirements have tended to standardize wheels and tires, bodies and body fittings; under clearance and track; they have made radiator protectors an essential and hooks front and rear for hauling purposes; they have cut down fuel consumption and done a great deal toward developing accessibility.

One of the most important results of these requirements is the development of carburetors with which gasoline, benzol or alcohol can be used as fuel. It was not the price of gasoline, which is very high abroad, so much as the possible stoppage of the supply in case of war, that gave rise to this requirement.

In another particular, that of developing motor trucks which would run satisfactorily on steel tires, the French government has not been successful. At first only steel shod trucks were allowed to qualify for the subsidy, and now their use is encouraged by making wear and tear on tires count heavily in figuring the cost of operating, thereby giving steel tires a big advantage over rubber tires. Despite this, steel tires were used less this year than in any previous trial, and not one of the trucks shod all around with steel was able to qualify. A number used rubber tires in front and steel on the rear, and some of these qualified.

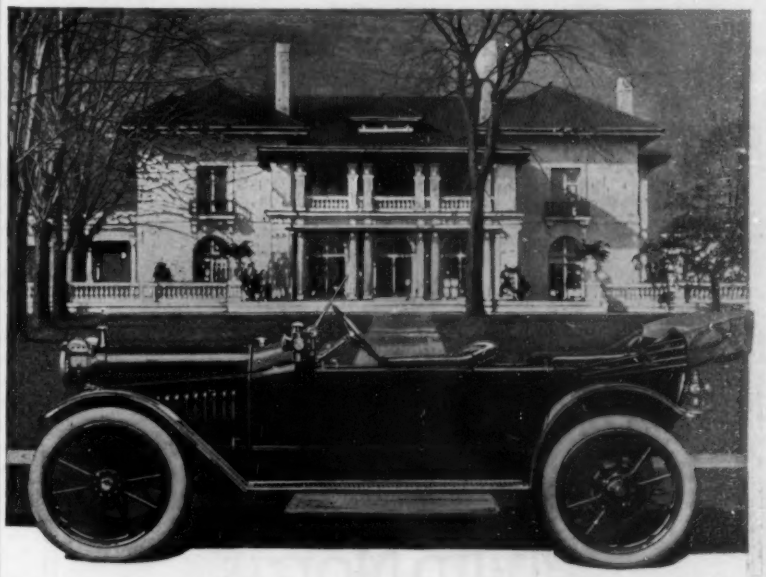
Outside of the purchase of a few score vehicles, most of which are used in the Philippines, the hiring of a few at different times in the past two years for use at various maneuvers, the promotion of two short tests and requesting manufacturers to furnish the names and addresses of all purchasers, our own Government has as yet done nothing toward utilizing motor trucks in army transport service. There are, however, more motor trucks in this country than in any two foreign countries combined; and in case of war our Government could purchase all it needed at a high price.

Discovery of a New People

(Concluded from page 261.)

Cape Bexley a recently abandoned village of forty snow houses was discovered on May 12th, 1910, with sled trails leading northward to Victoria Land. One hour later—in the middle of the frozen Dolphin and Union Strait—a man was discerned. He was sealing. Stefansson sent his Eskimo companion to interrogate him. The sealer drew his knife and awaited the attack of the emissary. After fifteen minutes of excited parleying in different dialects—for the sealer and the emissary spoke widely different dialects of the same tongue—peace was established. Stefansson then drew near. He speaks Eskimo himself; for the modern ethnologist is thoroughly acquainted with the dialects of the people whose customs and folklore he studies. Stefansson was the first white man the sealer had ever seen. Yet he was quite unmoved; he promptly concluded that the explorer was an Eskimo too.

The sealer turned out to be one of a small tribe numbering all told thirty-nine and calling themselves A-kū-li-a-kat-tăg-mī-ūt. Unlike the half civilized Eskimos with whom explorers have hitherto come in contact the Akuliakattamiut were honest and kindly. Indeed Stefansson's account of their traits bears but the general theory that the savage, uncontaminated by civilization is far more tractable, far more hospitable, far more considerate than his more sophisticated cousin who has come into contact with the trading station. No member of the Akuliakattagmiut showed any disposition to pry into Stefansson's baggage; no one burst into his hut unannounced; and so far from denying him food, the tribe even supplied him and his men with choice parts of freshly killed seals and huge musk-ox



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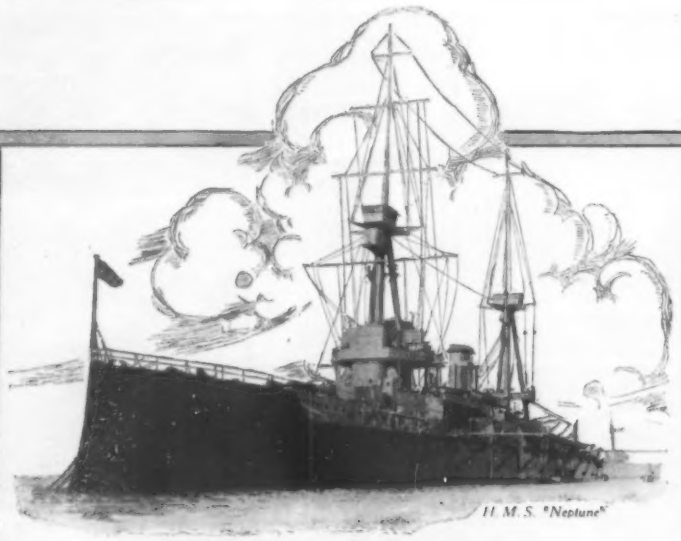
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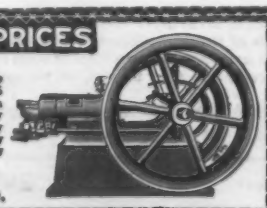

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horn flagons filled with steaming seal-blood soup, although their own dogs had no more than half-rations of meat.

People Who Had Never Seen a White Man.

Like the sealer on the ice in Dolphin and Union Strait, the tribe had never seen a white man, or an Indian, or even an Eskimo from the west. They had heard of other people to the west; but so vague were their ideas of what those people were that Stefansson and his Alaskan Eskimo were taken for brothers.

The discovery of a tribe, completely isolated from all civilizing influences, preserving unchanged customs and traditions that are perhaps centuries old, is an event the scientific importance of which can be gaged only by an ethnologist. Perhaps the lay reader can grasp the significance of the discovery if he considers that when studying the habits of an uncontaminated people it is often possible to determine accurately at what period more civilized tribes first adopted implements such as metal knives, at what period they first began to weave baskets and make fish-nets, and at what period the first signs of culture began to appear among them. Sometimes the region from which a tribe originally emigrated can be deduced.

Important as the discovery of a people who had never been influenced by white men unquestionably is, Stefansson made another discovery, which is of more popular interest. Shortly after finding the Akuliakattagamiut, Stefansson discovered on Victoria Land, north of Cape Bexley, Eskimos who seemed strangely like northern Europeans. They called themselves the Ha-nē-rāg-mi-ūt. Their total number is forty, of whom Stefansson saw seventeen. How different they were from the usual aborigines of the North may be inferred from the fact that Stefansson's Alaskan Eskimo, who had worked for years on a whaler, said: "They are not Eskimo; they are fo'c'sle men." "Two of them," says Mr. Stefansson, "had full chin beards to be described as light, tending to red; every one had light eyebrows; one—perhaps the darkest of all—had hair that curled slight. A few had typically European blue eyes."

The Possible European Origin of a Strange People.

What is the origin of these Scandinavian-like people? Here is a splendid opportunity for the student of heredity who accepts the modern Mendelian views. Are these people simply sports or mutations, as the modern biologist classes anomalies such as albinos? Or are they simply the result of an intermingling of north European stock with Eskimo stock? Here is a biological question of the utmost importance, a question that can be answered only after careful study of the physical characteristics of the tribe has been made, both from the anthropological as well as from the Mendelian standpoint.

Assuming that the Ha-ne-rag-mi-ut of Victoria Land are mutants, a study of the people from the Mendelian standpoint might reveal that the earlier, purer type was even more European than its descendants. Again, it might turn out that there was a direct admixture of European blood. Although it is much too soon to venture any hypothesis, and although Mr. Stefansson has arrived at no definite conclusions as yet, it is a matter of much interest to ascertain what are the possibilities of a direct mixture of European blood.

In the fifteenth century the entire Norse-Teutonic colony of Greenland, with whom the name of Lief Ericson is historically associated, disappeared. The colony's importance may be judged from the fact that it had a bishop of the Church of Rome, two monasteries, a convent, fourteen churches, and over three thousand inhabitants. They were a seafaring people, who had crossed the water to Norway and to America before Columbus had set out to discover Cathay. Documents in the Vatican show that the colony was in a prosperous condition as late as 1412. Yet, in the seventeenth century Hans Egede found only Eskimo in Green-

The Panama Canal

The time is drawing nigh when the Panama Canal will cease to be a vision and will become a reality. No engineering work in the entire history of the world is of greater magnitude. For decades statesmen and engineers have urged the digging of a waterway which would unite the Pacific with the Atlantic.

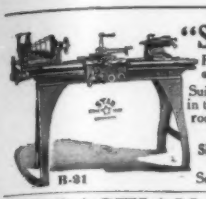
The Panama Canal is a monument to American engineering genius. To describe it adequately the SCIENTIFIC AMERICAN will devote to it the issue of November 9th—the November mid-month number. How the great locks were constructed in which ocean-going steamers will swim, how a mountain was cut in two to make way for the Canal, how great steam shovels that scoop up five tons of dirt at a time dug out the bed of the waterway, and how landslides—avalanches containing millions of cubic yards—were coped with, all this will be told. Our editor, Mr. J. Bernard Walker, made a special trip to Panama in order to gather much of the material which will appear in this number. He spent several weeks at the Isthmus, studied every square inch of the ground, spoke with the men who are doing the great work—Col. Goethals, Col. Gorgas, and the rest—and brought with him facts which have not yet found their way into print, and which will first appear in the SCIENTIFIC AMERICAN.

The Grand Central Terminal

There will soon be opened in the city of New York, a gateway that leads into the heart of the western world's greatest city, a gateway that symbolizes the peace-making work of the engineer and the changes that he has wrought on civilization. The portal of a medieval city was an opening in a battlemented wall. Through it no man dared go unchallenged. The new gateway of New York is a different structure. Far more imposing, far more monumental than any gateway of old, the Grand Central Station will welcome tens of thousands, who will pass through its marble halls with no one to ask them whence they came or whither they go.

That beautiful structure may be regarded in two ways—as a symbol of civilization's progress and as an engineering work. To Mr. Jules Guerin, one of the most distinguished artists of our time, has been intrusted the task of presenting the symbol. He has made for the SCIENTIFIC AMERICAN two masterpieces—one of them a colored cover, in which the station is shown looming up mysteriously in the night, illuminated from within by its own myriad lights and from without by the welcoming lights of the metropolis. He has also prepared a double page drawing of the "Terminal City"—a drawing in which the brush and pencil have explained better than mere words can explain it, the symbolic meaning of this vast structure of marble and steel, clustered about with buildings that may be regarded as appurtenant to it—post offices, hotels, and apartment houses.

The engineering side will be treated in the usual SCIENTIFIC AMERICAN way. Fascinating, indeed, will be the story of the work. Few realize that in the Main Station alone there are approximately 28,930 tons of steel; that the total excavation amounted to 3,094,750 cubic yards; that there had been removed up to May 1st, 1912, 203,925 carloads, which would make a train reaching from New York city to Omaha; and that to blast out the 2,000,000 tons of rock, 730,000 pounds of dynamite have been used. Then, too, there is the story of the tracks, how they are connected with the subway, how they have been laid underground tier on tier, and how the whole station has been planned so that it would be not an eyesore, but an architectural adornment to a great city.



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land and no trace of the Scandinavian blood or language. What became of the colony? Was it massacred by Eskimos? Was it swept out of existence by famine or pestilence? Or did it emigrate in a body?

"The folklore collected by Knud Rasmussen in Smith Sound, by Prof. Boas in Baffin Land and the Hudson Bay Region, and the sum of the evidence secured by our expeditions," says Mr. Stefansson, "seem to me to point strongly to the probability that the Norse colony in Greenland was never entirely exterminated, but that the larger portion of it escaped, and it is their descendants, mixed with the descendants of the Eskimos of their time, whom we now find in Victoria Land. We realize fully that there are several theories that might explain the presence of blonde Eskimos; we merely consider that this is the most probable one."

In support of a possible Scandinavian ancestry, Mr. Stefansson points out that there are slight resemblances between the language of the blonde Victoria Land Eskimo of to-day and the old Norse language. Then, too, the Victoria Land Eskimo sings at least one song, alliterated in the old Norse scaldic style—something unheard of among other Eskimos. The literary resemblances between the modern Victoria Land Eskimo and the old Norsemen are, however, not conclusive enough to point unmistakably to a Scandinavian origin for the tribe. But taken together with the physical characteristics of the tribe, which will soon be studied on the basis of the measurements and photographs that Mr. Stefansson has taken, it is possible that a chain of evidence will be forged, so strong, that what is now tentatively offered only as a mere theory may become an established ethnological fact.

In the opinion of Dr. Clark Wissler, curator of the department of anthropology of the American Museum of Natural History, Mr. Stefansson has returned to the United States with an amount of material for study that is unusually rich and promising. Mr. Stefansson hopes to prove after he has had an opportunity of studying a large collection of ethnologic material that represents the life, customs, folklore not only of the hitherto unknown Eskimos of Victorial Land, but of the known tribes that inhabit the region about Point Barrow and the northeastern shore of Alaska, that the Eskimos as a whole came from the east along the north shore of the American continent to Alaska. It may turn out that the Eskimo traditions in regard to certain important events, such as the chronological sequence of the founding and abandoning of villages can be relied on for longer periods than ethnologists have hitherto assumed. Thus, it may become possible for Mr. Stefansson to show with sufficient accuracy just when Eskimos first reached the mouth of the Yukon River or whatever point it was that brought them in contact with people of another race.

So, too, the archeological relics that Mr. Stefansson has brought back may show that such arts as pottery-making and basket-weaving are far more ancient in Eskimo culture than anthropologists have supposed. It seems reasonably certain at present that Mr. Stefansson's archeological work extends the known area of the use of pottery over a thousand miles east of Point Barrow, which was by many considered the eastern limit of the knowledge of the art.

The expedition has brought back specimens of what may prove to be rich iron ore from Victoria Land, north of Cape Bexley. Copper is picked up almost anywhere by the natives of the whole Coronation Gulf district, each family having its favorite place to search for knife and arrow material.

A Jubilee of the Umbrella

ON August 12th it was 200 years ago that Jonas Hanway of London was born, who is credited with being the first person to use an umbrella. When first carried, the latter consisted of whalebone, covered with heavy oilskin, the whole weighing nearly 10 pounds.

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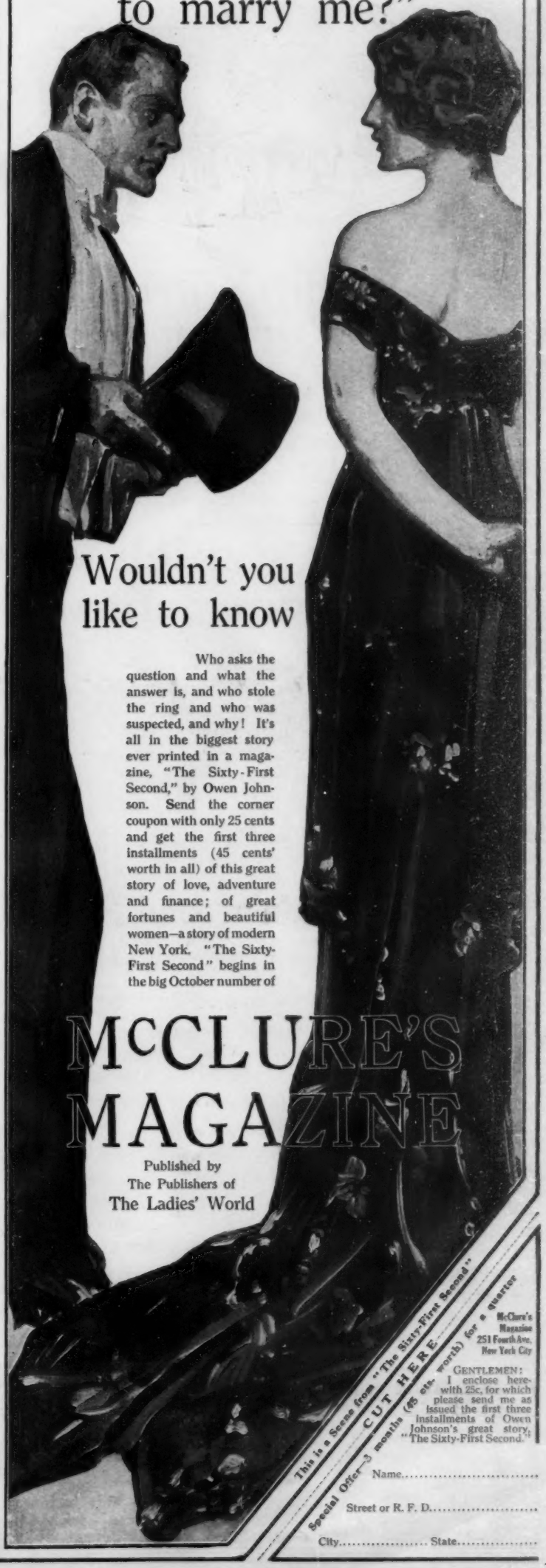

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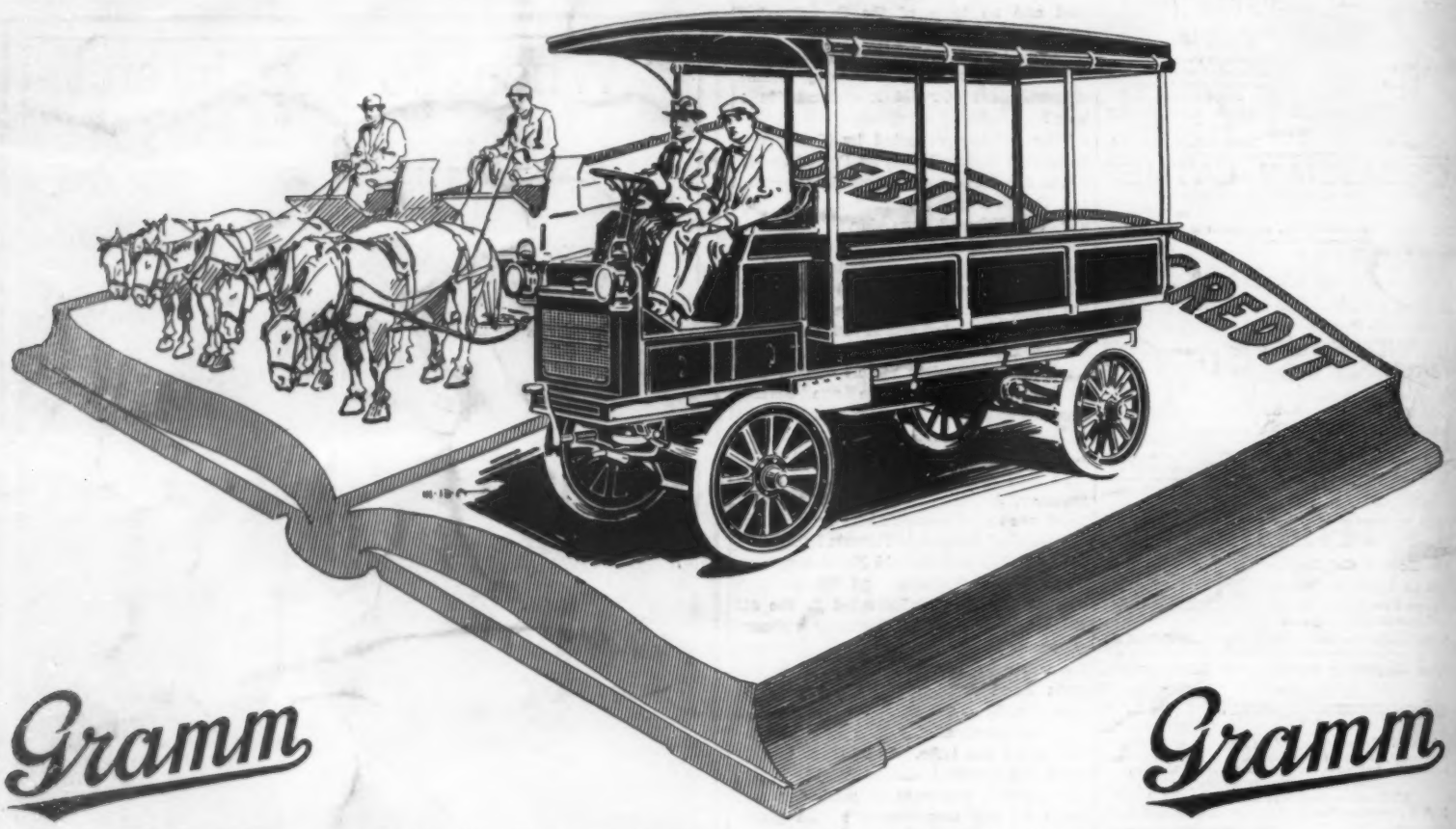

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